

POPSIG

A palm oil newsletter brought to you by:
IChemE Palm Oil Processing Special Interest Group

IChemE

Palm Oil Processing
Special Interest Group

***Correcting the myths/
misperception on palm oil***

WHAT'S IN THIS ISSUE

2021 Roadshow/Virtual Site Tour

MOSTA: Holding Glycidyl Ester In Check

MPOC Science & Sustainability Engagement
Series 1 & 2

*A Chemical Engineer in the Palm Oil Milling
Industry Book Review*

Oils & Fats International Congress 2021



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Editor's Message

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21st year of the 21st century, it has been quite a journey for everyone since the first outbreak of COVID-19 in 2020 and the recent nationwide lockdown. There's nothing new about the 'new normal' nowadays. Undeterred by that, the first six months of 2021 for POPSIG has been packed and extremely happening with the continuous events, webinar and university roadshows organized.

We are pleased to feature eight webinars on various topics relating to palm oil industry in this Issue. We kick start the year with Online Performance Improvement Solutions webinar by Mr Suryaprakash Digavalli in January. Mr U. R. Unnithan who is a fellow IChemE (FIChemE) and the founder of SUMWIN Group has been invited to share on Patented Cost Effective 3-MCPD & GE Mitigation Technology. SUMWIN is also the winner of Palm Oil category in IChemE Malaysia Award 2020. Supporting the movement towards green technology, Ir Dr Teow Yeit Haan has presented a webinar on the topic of Integrated Zero Waste Solution for Palm Oil Mill Effluent Treatment. Mr. Chia Ing Chuk (Desmet Ballestra), Mr. Mohammad Saiful Nidzam Ismail (Sime Darby Plantation) and Mr. Alexey Shevchenko (Alfa Laval) came on board as speakers for MOSTA's Glycidyl Ester Development: Holding Glycidyl Ester (GE) In Check webinar. Prof Ir. Dr. Denny K.S. Ng from Heriot-Watt University Malaysia joined the webinar on 30th April 2021 to present on Potential and Feasibility of Bio-Methane in Palm Oil Industry as well as our very own Deputy Chair, Dr Viknesh Andiappan on Enhancing the Way We Make Decisions in Energy Planning in Mathematical Models on 19th May 2021 webinar. MPOC Science and Sustainability Engagement Series 1 and 2 on Green Technology Innovations in Malaysian Palm Oil Industry Downstream Sector and Palm Tocotrienols respectively has featured many speakers sharing each of their expertise, researches and findings.

Continuing the 2020 virtual roadshow mode to adapt with the COVID-19 culture, three POPSIG virtual roadshow and site tour events planned for the first half of 2021 has been held successfully. A total of 303 participants joined the first tour of the year with Dia-Chemical Sdn. Bhd., in collaboration with UTAR IChemE Student Chapter. IChemE Student Chapter Festival, a virtual global event which was jointly organized by IChemE Malaysia, IChemE Student Chapter Universiti Malaya and IChemE Student Chapter University of Nottingham Malaysia, received a total of 137 engineering undergraduate participants from different universities all around the world. Final roadshow for the first part of this year hosted by Universiti Teknologi MARA (UiTM) IChemE Student Chapter and Persatuan Pelajar Fakulti Teknologi Kejuruteraan Kimia Malaysia Perlis (FTKK UniMAP), was held on 25th May 2021 with total of 343 participants. We hope to continue this event throughout the rest of this year.

POPSIG founder member Ir. Qua Kiat Seng articles on Net-Zero Carbon Emission (first published in The Edge) and his review for 'A Chemical Engineer in The Palm Oil Milling Industry' memoir authored by Ir. Hong Wai Onn are also included in this instalment. Articles on 'In Defense of Palm Oils: Why We Should Be Supporting the Industry's Move Toward Sustainability – Not Demonizing It' (as published in Next Billion) and 'Can Palm Oil Truly Be Sustainable? Malaysia Offers a Certification Model We've Been Waiting For' (as published in The Parliament Magazine) by Mr. Robert Hii, the CSPO Watch owner who has worked extensively with industry stakeholders including conservation groups and smallholders as part of his mission to find an equitable definition of sustainable palm oil. We also feature a journal shared by Ir. Hong Wai Onn on Improving Sustainability of Palm Oil Production by Increasing Oil Extraction Rate.

Catch up with our news on MCY and Final Year Design Award 2020, MSPO Standard Revision, OFIC 2021, IOI Pan Century Oleochemicals Challenge Trophy Win at PMHA, POPSIG Article Submission news and other announcements in this newsletter. Appreciations to all valued POPSIG members and POPSIG sponsors for the continuous support and dedication in making it all happen. I wish all readers good health, stay safe and thank you for reading.

POPSIG gratefully acknowledges our sponsors



Virtual Site Tour: Visit to Dia-Chemical Sdn. Bhd. By POPSIG-UTAR.

On 22nd February 2021, a two-hour presentation and virtual tour of Dia-Chemical Sdn. Bhd., followed by a Question and Answer (Q&A) session took place in Zoom online platform. This event is hosted by UTAR IChemE Student Chapter. The event started at 3pm and ended at 5pm. Dia-Chemical Sdn Bhd had established in year 2006 and this company specialises in providing innovative solutions for water and wastewater treatment.

Professor Ir Dr Chong Mei Fong, introduced Dia-Chemical Sdn. Bhd, followed by Dr Viknesh Andiappan who introduced the Palm Oil Processing Special Interest Group (POPSIG), and Mr Vincent Tiang Soon Thai who gave a speech on the role of chemical engineers in palm oil industry.

After the introductions, a virtual tour of the laboratory and production, followed by a Q&A session took place. All the participants showed responsive interaction with the speakers.

IChemE members, non-members and lecturers from the Department of Chemical Engineering of UTAR attended the event. A total of 212 IChemE members, 29 non-members, 2 staff and 60 invited guests attended this virtual session.

2.0 Background of the Company

DIA-CHEMICAL SDN BHD

established in 2006

We aspire to be the leader and innovator in providing sustainable solutions in water and wastewater problems.




Chong Mei Fong

Prof. Ir. Chong Mei Fong introduces Dia-Chemical Sdn. Bhd.

Palm oil mill

Palm oil mill produces crude palm oil and kernels as primary products and biomass as secondary product



Mr. Vincent explained the various roles of a chemical engineer palm oil industry.

Our activities include...

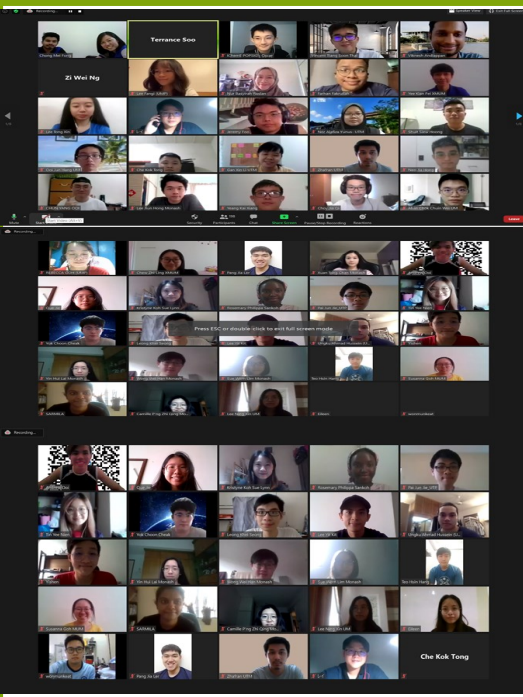
- Outreach activities





IChemE
ADVANCING CHEMICAL ENGINEERING WORLDWIDE

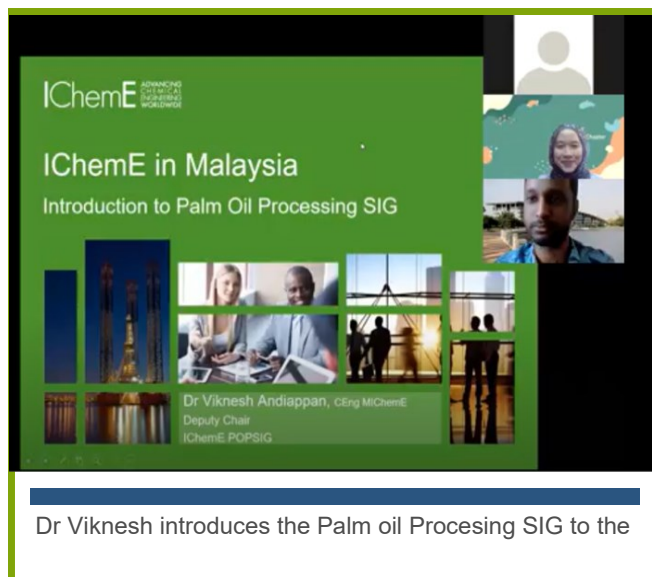
Dr. Viknesh introduces the Palm Oil Processing SIG (POPSIG) to the participants.



Group photo session.

Virtual Site Tour: IChemE Student Chapter Festival UM-Nottingham

POPSIG Virtual Site Tour was the featured event on the second day of IChemE Student Chapter Festival which takes place on the 10th March 2021. The festival is a virtual global event jointly organised by IChemE Malaysia, IChemE Student Chapter Universiti Malaya and IChemE Student Chapter University of Nottingham Malaysia with a total of 137 engineering undergraduate participants from different universities all around the world. The festival started with an introduction about IChemE Palm Oil Processing (POPSIG) by Dr Viknesh Andiappan, the Deputy Chair of POPSIG to help students gained an in-depth understanding about the POPSIG community, activities and incoming competitions.



Dr Viknesh introduces the Palm oil Processing SIG to the

Next, the participants were introduced to the roles of chemical engineers in the palm oil processing industry by Ir Hong Wai Onn, the EXCO for POPSIG. Due to the ever-increasing human population which was estimated to reach a total of 9 billion by year 2050, palm oil is said to be an alternative to meet the growing needs of oils and fast on shrinking arable lands. Palm was highlighted to outmatch all other oil crops in terms of efficiency per unit land as only 1/10 of land size is required to produce the same amount of oil. Besides, palm oil after the oleochemical process is versatile in usage to produce a range of consumer products. It was emphasized during the session that the role of a chemical engineer is to improve quality of life with the knowledge learnt in the multidisciplinary field of study by building sustainable and safer processes. Future opportunities for chemical engineers also lie in automation as we welcome the 4th Industrial Revolution. A skilled chemical engi-

neer is regarded as a stable job that is in demand in the market now and in the future. At the end of this session, it was shown through an interactive short survey that participants have changed their perception on how relevant is chemical engineering in palm oil processing, with a higher percentage of students agreeing that it is very much related.

Then, the participants joined the Virtual Laboratory and Production Tour by Kewpump (M) Sdn Bhd. Mr Ceasar Nair, the Chief Operating Officer of Kewpump took the participants through a virtual tour. Kewpump was introduced as a producer with full scope of design, metal casting and machining capabilities equipped to handle customised or industry standard orders in compliance to ISO standards. They specialize in the manufacturing of stainless steel end suction centrifugal pumps and nut cracking machinery. Besides that, the participants were introduced to stages that include design using simulation software to cast a mould, manufacturing the pump using machineries and a series of Quality Control procedures that the products will undergoes in this process. The Research & Development facilities such as 3-Dimensional (3D) printer were also showcased in this session. A brief sharing about Pump Fundamentals for Chemical Engineers were given to equip fellow participants with the relevant knowledge and to deepen their understanding on pumps.

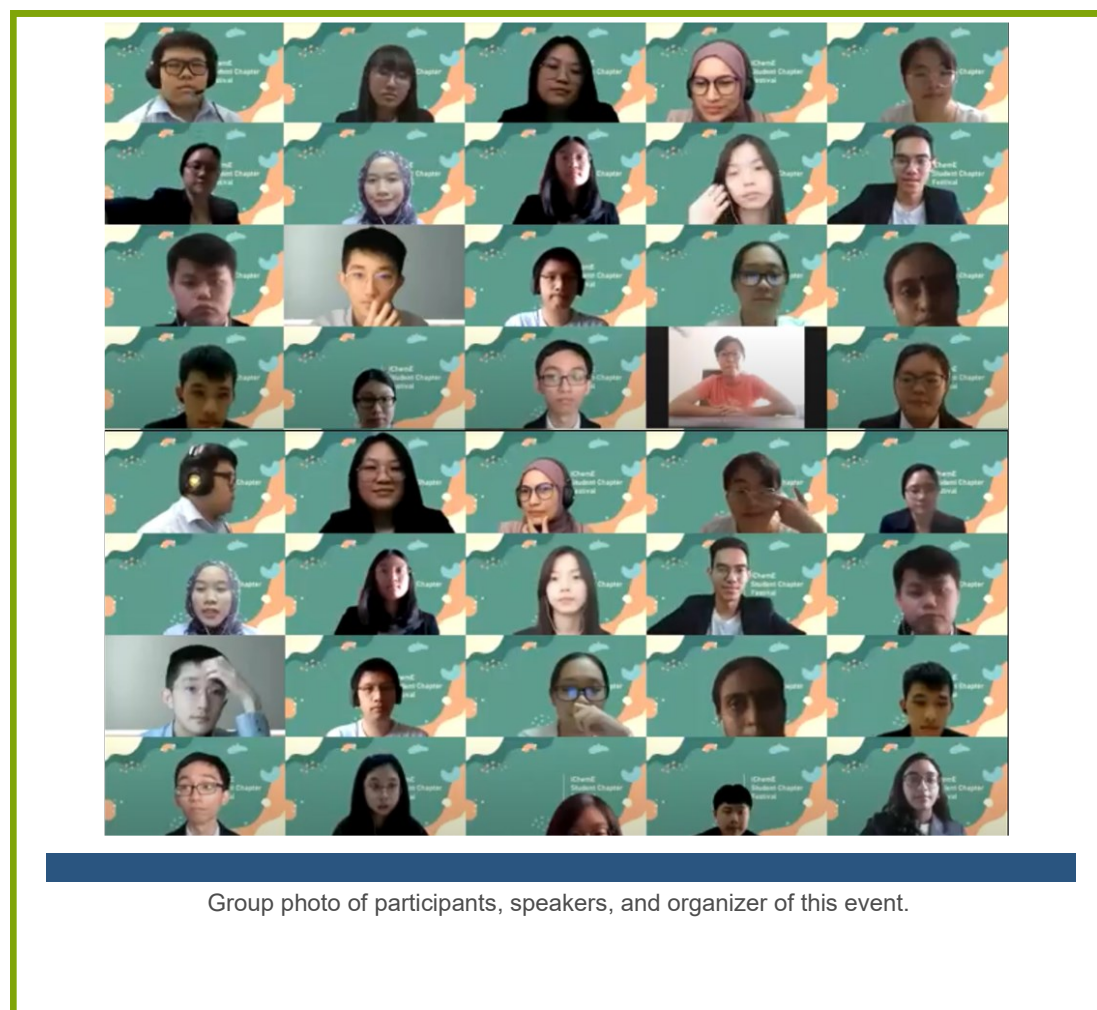
Thereafter, Ms Areej Taufik from Malaysian Palm Oil Council (MPOC) provides introduction on palm oil, from its fruit to nutritional benefits and major food application. It is concluded by the speaker that palm oil is suitable for cooking at high temperatures due to its stable nature. Not only that, palm oil is rich in nutrients and is suitable for the making of various types of food. The participants were given the exposure to learn more about palm oil and its facts.

The last session of the day was the Kahoot Challenge to evaluate the participants understanding on the contents delivered by the speakers of this event. Prizes were given out to the champion and runner-ups for this competition. In addition, a call for submission for the Best Post-Event Report Award had been announced at the end of this session. The winner for this award goes to Ms Gebriella Anthony, Faculty of Engineering, Universiti Malaya. Tentatively at 12:25 pm, the closing ceremony was held marking the end of the festival.

The organising committees of IChemE Student Chapter Festival would like to express their sincere gratitude to POPSIG for being part of the Festival's success. The insightful sessions have greatly enriched their knowledge and understanding of the palm oil industry.



The image shows a digital award certificate with a dark blue background and a light blue border. At the top left is the IChemE logo. The main title is "BEST POST-EVENT REPORT AWARD" in large white letters. Below this, the winner's name "Gebriella Anthony" is displayed in bold white text, followed by her affiliation: "Chemical Engineering Student, University of Malaya IChemE Student Chapter". The certificate specifies the award is for a "Winner Report" titled "POPSIG VIRTUAL SITE TOUR: ICHEME STUDENT CHAPTER FESTIVAL". It also includes "Event Detail" information: "ICHEME STUDENT CHAPTER FESTIVAL, 10 APRIL 2021". At the bottom, there are social media icons for IChemE.org, Facebook (IChemEPOPSIG), Instagram (ichemepopsig), and Twitter (IChemEPOPSIG). A dark blue bar at the very bottom contains the text: "Winner Report for POPSIG Virtual Site Tour: IChemE Student Chapter Festival."



UiTM-UniMAP University Roadshow

On 25th May 2021, a two-hour university roadshow had been successfully hosted by Universiti Teknologi MARA (UiTM) IChemE Student Chapter and Persatuan Pelajar Fakulti Teknologi Kejuruteraan Kimia Universiti Malaysia Perlis (FTKK UniMAP).

by Ms. Tharshinye Soomaran, the participants get to know how to become chartered IChemE member.

The objectives of this event is to enhance the interaction between IChemE-UiTM Student Chapter, and IChemE POPSIG, to provide a platform for students to get the new and current knowledge from palm oil industries, and to increase the engagement of university with industry and IChemE.

POPSIG is glad to have few knowledgeable speakers who gave a sharing experience sessions with the participants who attended in this university roadshow webinar. The invited speakers are Dr Viknesh Andiappan (Deputy Chair of IChemE POPSIG & Assistant Professor at Heriot-Watt University Malaysia), Mr Ahmad Shahdan bin Kasim (Senior Executive in Science, Environment, and Sustainability Division (SESD) in Malaysian palm Oil Council (MPOC), Mr Prasath Ramani (Industrial Technology Specialist at Novozymes Malaysia Sdn Bhd), and Ms Tharshinye Soomaran (Associate Fellow of Malaysian Institute of Management & Country Manager at IChemE based in Kuala Lumpur).

POPSIG will be working with more universities in Malaysia for the upcoming 2022 University Roadshow. Stay updated with the event on the IChemE POPSIG website.

25.05.2021 | TUESDAY | 9:00AM - 11:00AM
POPSIG UNIVERSITY ROADSHOW 2021
 SPEAKERS' PROFILES

DR. VIKNESH ANDIAPPAN
 Deputy Chair of IChemE POPSIG & Assistant Professor at Heriot-Watt University, Malaysia

MR. AHMAD SHAHDAN BIN KASIM
 Senior Executive in Science, Environment and Sustainability Division (SESD) in Malaysian palm Oil Council (MPOC)

MR. PRASATH RAMANI
 Industrial Technology Specialist at Novozymes Malaysia Sdn. Bhd.

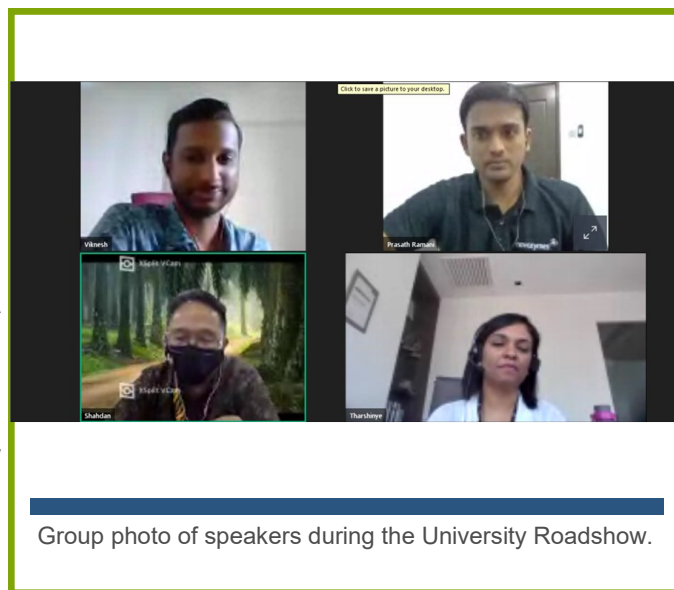
MS. THARSHINYE SOOMARAN
 Associate Fellow of Malaysian Institute of Management & Country Manager at IChemE based in Kuala Lumpur.

Logos for IChemE, MPOC, Universiti Teknologi MARA, and Universiti Malaysia Perlis are displayed at the bottom.

Guest speakers for the IChemE POPSIG-UiTM-UniMAP University Roadshow.

A total of 43 participants from Universiti Teknologi MARA (UiTM) and 300 participants from Universiti Malaysia Perlis (UniMAP) attended this event.

The event started with the introduction of IChemE-POPSIG by Dr Viknesh Andiappan, where the participants get to know more about IChemE-POPSIG. Then, the event continues with the sharing session by the Malaysian Palm Oil Council (MPOC) panel, Mr. Ahmad Shahdan which enlightened the participants about the real-working situation in this industry. Furthermore, the participants get some insightful information about the roles of chemical engineers in the palm oil industries from Mr. Prasath Ramani. In the last session presented



Online Plant Performance Improvement Solutions

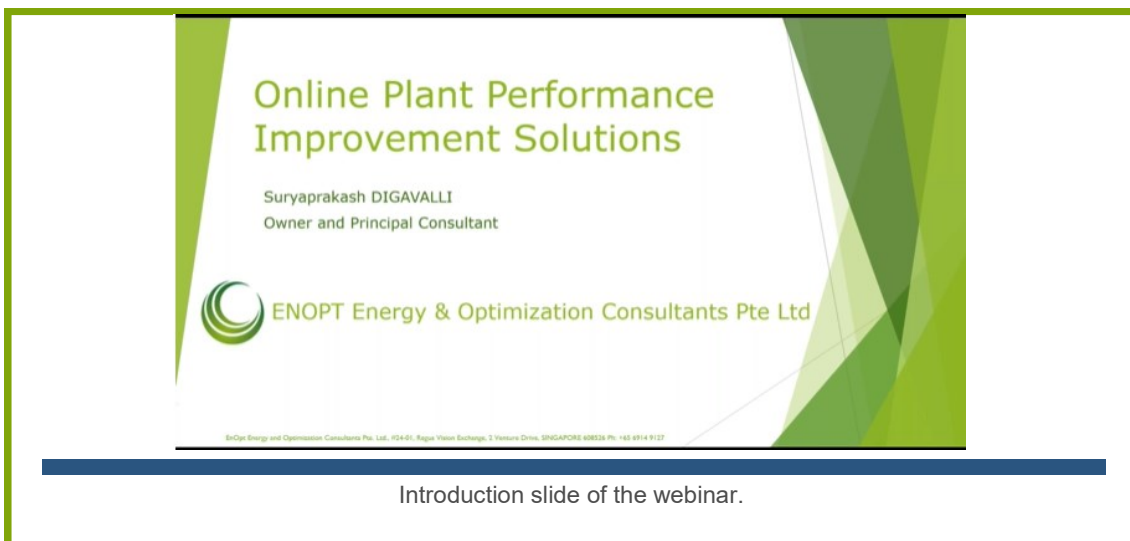
On 5th January 2021, IChemE POPSIG invited speaker Mr Suryaprakash Digavalli to present the webinar on the topic of Online Performance Improvement Solutions. Mr Digavalli graduated from Andhra University, Visakhapatnam, India, in Chemical Engineering and now have more than 17 years experience in operational at refinery, gas plants and petrochemical plants.

Well versed in mathematical model developments for the industry, Mr Digavalli is also a certified Energy Auditor from Bureau of Energy Efficiency India and the Lead Auditor for Certified ISO 50001 – Energy Management Systems. He has an advanced diploma in business management and handle key account management experience for large oil company in Middle-East.

in overall energy consumption.

2. **PINCH ANALYSIS AND HEAT INTEGRATION:** re-vamps and debottlenecking where plant design is changed. High investment and approximately 15% reduction in overall energy consumption.

The tools that are being discussed in this forum are handles to empower the operators and process engineers to automate the reporting and accounting components. Furthermore, the optimization decisions are brought to light for a profitable utilities plant operation. The operator could easily take the recommendations respecting plant energy demands and reliability constraints of the process and benefit by energy savings from 2-5%.



Introduction slide of the webinar.

Energy management has become one of the key driver for organizations targeting lower carbon footprint and sustainability while simultaneously moving towards effective energy management and thereby reducing operational cost. In his introduction to this webinar, Mr Digavalli highlighted that how efficient the operational team is handling the energy in operation is the main point of concern in energy management and with the data that the operation has, are they taking the right decision towards energy improvement?

Advocating on “Rational Use of Energy and Resources”, Mr Digavalli explains that energy savings are typically achieved in 2 ways which he later further dissected in more details during the webinar session:

1. **UTILITY OPTIMIZATION:** optimization with no hard changes to the plant. Low investment and 2-5% reduction

Optionally, there could be reconciliation algorithms that could be deployed to improve quality of data for this optimization and energy management.

The tools discussed during the webinar was:

- ◆ PinchOpt: pinch analysis and heat integration tool for CAPEX projects
- ◆ UtOpt: online utility optimization tool for OPEX performance improvement
- ◆ PerfOpt: performance monitoring and optimization tool for significant energy users such as boilers, cogeneration units, compressors etc.

Patented Cost Effective 3-MCPD & GE Mitigation Technology

Webinar on Patented Cost Effective 3-MCPD & GE Mitigation Technology was held on 1st March 2021. Mr U. R. Unnithan, a fellow IChemE (FIChemE) was invited as the speaker for this topic. Mr Unnithan is the founder and CEO of SUMWIN Group, co-founder and CEO of DIBIZ PTE LTD, has 36 years of corporate and professional experience in the field of oils and fats, oleo-chemicals and biofuels. He is also the President of the Malaysian Biodiesel Association, actively involved in the implementation of the biodiesel program in Malaysia since 2001.

In accordance with the latest EFSA guidelines, 3-MCPDE & GE levels in refined palm oil shall meet limits of 2.5 ppm & 1 ppm max. 3-MCDPE levels will be lowered to 1.25 ppm for refined palm oil in line with other refined vegetable oils in the coming years.

that is tailor made depending on individual refinery designs helps to further reduce both 3 MCPDE and GE formation during deodorization and meets both 3MCPDE < 1.25 PPM & GE < 1 PPM.



Introduction slide of the webinar.

Over the years, various research organizations and companies has come through with a number of solutions to address this challenge. Among the popular methods introduced to remove chlorine in CPO is CPO washing process which is continuously followed by centrifugal separation. While this method is effective, it also results in higher oil loss in washed water due to emulsification, contributing to effluent treatment issues due to high COD value in washed water and having high maintenance costs to the system. SUMWIN's patented extraction technology overcomes all these problems by offering low CAPEX and low OPEX by avoiding emulsification and thereby virtually eliminating oil loss in water.

In addition, SUMWIN has developed a proprietary adsorbent under the trademark REDGEM that helps reduce precursors to 3MCPDE and GE in the bleaching process with no modification required in refineries and with no additional OPEX. Further engineering modifications to the deodorizer system



SUMWIN formulated adsorbent Redgem.

In his introduction to the topic, Mr Unnithan shares the wish list of industry practitioner's in the process of mitigating 3-MCPDE & GE in palm oil which includes no reduction in plant throughput, no additives added in the process affecting any certification system (e.g. Halal, Kosher), no increase in maintenance cost and downtime for maintenance, etc. Before ending the session, Mr Unnithan once again enumerate the list and shared SUMWIN's solution to each concern. To quote in his slide "Mission accomplished!".



SUMWIN is also the winner of Palm Oil category in IChemE Malaysia Award 2020.

Green Technology in Action: Integrated Zero Waste Solution for Palm Oil Mill Effluent Treatment

It was with pleasure to have Ir Dr Teow Yeit Haan to present a webinar on the topic of Integrated Zero Waste Solution for Palm Oil Mill Effluent Treatment on 30th March 2021. Ir Teow who is currently a senior lecturer at National University of Malaysia has been involved in membrane technology for the past ten years and has dedicated her research activities in the field of membrane synthesis and characterization, membrane application for water purification and wastewater treatment, membrane fouling, as well as water disinfection technology & adsorption.

- ◆ Algae CO₂ sequestration & effluent treatment
- ◆ Membrane treatment for water recycle and reuse
- ◆ Bioconversion of EFB agro waste into organic fertilizer

Through industry-academia collaboration projects on Zero Waste Solution, both industry and academia research have been able to catch up on each other's progress directing towards green technology. The developed zero waste technology is now being fully demonstrated in pilot scale facility installed at Sime Darby Tennamaram Palm Oil Mill, Selangor. Ir Teow shared the pilot plant layout, photos of units installed, as well as a video tour of the Universiti Kebangsaan Malaysia (UKM) and Yayasan Sime Darby (YSD) developed pilot plant during the session.

Before ending the session, Ir Teow highlighted that this UKM-YSD project serves as a pioneer technology that could potentially change the perceptions on palm oil industry. This zero waste research program along with production of biogas, bio fertilizer & recycle water would suggest a good alternative sustainable management practice in palm oil industry which also align with the principle of RSPO on environmental responsibility conservations on natural resources & biodiversity.

Articles and report on this project has also been published in several local newspapers dated back from 2015 including Berita Harian (28 April 2015), Kosmo (29 July 2015), Sarawak Tribune (10 December 2015) as well as recently in IEM Magazine and Berita Harian in 2020.



Introduction slide of the webinar.

It is no foreign to the industry that the process of extraction and purification in palm oil processing operation comes with the bulky palm oil mill effluent (POME). In her introduction to the topic, Ir Teow highlighted about POME's extreme COD and BOD content and it being the single largest source of industrial wastewater pollution in Malaysia. Along with other controversies, palm oil industry constituting to environmental impact is also in the limelight. In relation to green technology movement to ensure a long term productivity and sustainability of the palm oil industry, the mission for Zero Waste Solution is to turn palm oil mills into green factories targeting for carbon neutral. No pollutants to the air, ground and water.

Integrated Zero Waste Technology thrust area involves:

- ◆ Biomass Treatment for Bio-hydrogen production
- ◆ Purification of Bio-hydrogen for power & steam generation
- ◆ Biomass (EFB) pre-treatment for Bio-hydrogen production



Zero Waste Palm Oil Processing with various institutes and universities.

Holding Glycidyl Esters (GE) in Check

GLYCIDYL ESTER DEVELOPMENT:
Holding Glycidyl Ester (GE) in Check

WELCOME ADDRESS
Academician Tan Sri Emeritus Prof Datuk Dr. Augustine S.H. Ong President, MOSTA

Moderator
Ir. Qua Kiat Seng
Cing FICHEM Senior Lecturer, School of Engineering, Fellow of Monash-Industry Palm Oil Education and Research (MIPO) Platform Monash University Malaysia

SPEAKER
Mr Chia Ing Chuk
Technical Manager Desmet Ballestra (M) Sdn Bhd

SPEAKER
Mohammad Saiful Nidzam Ismail
Chief Chemical Engineer II, Process Technology Unit Sime Darby Plantation Research Sdn Bhd

SPEAKER
Mr Alexey Shevchenko
Global Process and Engineering Manager, Edible Oil Systems Alfa Laval Copenhagen A/S

REGISTRATION FEES
MOSTA MEMBER RM 130 / USD 33
NON-MOSTA MEMBER RM 150 / USD 38

HOW TO PAY?
1. Bank in to MOSTA Bank Account (MBB No. 512530-155068)
2. Send bank-in-slip to secretariat (proof of payment)

TOPICS HIGHLIGHTS
Mitigating Process Contaminants during Palm Oil Refining: How to Prevent the Formation of GE and How to Eliminate GE Once Formed
Sime Darby Plantation Journey in Mitigating Glycidyl Esters (GE) Formation in Refined Palm Oil
Alfa Laval PalmFlex Refining Technology to Reduce GE and MOSH in Palm Oil
Question & Answer

7th APRIL 2021
10am-12pm

03-71182044 / 2044 (Office) | mosta.secretariat@gmail.com

Flyer of the webinar.

Tan Sri Datuk Dr Augustine Ong, the President of MOSTA, is very keen to see 3-MCPDE (3-Monochloropropanediol Esters) and GE (Glycidyl Esters) managed and stresses that “as we know the chemistry of the formation and elimination of Glycidyl Esters (GE) and 3-MCPDE” better and more economical ways of removing them will be found. POPSIG and MIPO agree and this time 5 chemical engineers came together to share with participants the latest developments.

In 2020 MOSTA organized two events viz. a Workshop on Mitigation of 3-MCPDE on 19th April and a Webinar on Mitigation of 3-MCPDE and GE: Industry Practice on 15th October. As there was less discussion on GE, given that its maximum level was set as far back as 2018 by the European Commission, Tan Sri suggested to focus on GE. Ir. Qua Kiat Seng, who wrote an article in The Chemical Engineer (February 2021 issue 956) “Oils & Fats: Essential Engineering”, agreed to be the moderator.

Mr. Chia Ing Chuk, En. Mohammad Saiful Nidzam Ismail and Mr. Alexey Shevchenko came on board as speakers. As the webinar would be very early in the morning in Copenhagen, Shevchenko sent in a recording and Mr. Daniel Ng, Vice President, Food & Water Division of Alfa Laval in South East Asia was on hand to answer questions. So, we have the 5 chemical engineers.

Desmet Ballestra

Mr. Chia’s paper was “Mitigating process contaminants during palm oil refining: how to prevent the formation of GE and how to eliminate GE once formed”.

A low DAG (diacylglyceride) content of less than 3-4% in crude palm oil is a prerequisite to keep the GE in deodorized palm oil below 2ppm. GE formation depends on time and temperature and there is almost no net formation of GE below 230°C. A dual high temperature fast stripping and low temperature deodorization column can serve the purpose.

Glycidyl esters can also be ‘removed’ from refined oil by post-bleaching with acid activated bleaching earth followed by mild deodorization. Here GE is converted to monoglycerides. While this double refining step comes with higher operating cost the GE will be considerably less than 0.5 ppm in RBD palm oil fractions.

Desmet Ballestra offers 3 mitigation routes:

1. Qualistock+™ Dual Temperature Deodorisation: 0.36 ppm GE
2. Post stripping of GE from Refined Palm Oil: 0.14 ppm GE
3. Mild Post Refining with 2nd bleaching and 2nd deodorization: 0.15 – 0.40 ppm GE

Desmet Ballestra recommends their Sublimax™ 2G vertical ice condenser to achieve vacuum as low as 1.5 mbar.

Sime Darby Plantation (SDP)

En. Saiful’s paper was “Sime Darby Plantation’s Journey in Mitigating Glycidyl Esters (GE) Formation in Refine Palm Oil.”

As an integrated organization SDP undertakes upstream initiatives in the mitigation of GE whilst Sime Darby Oils (SDO) focuses on mitigation at the refinery. Their R&D has evaluated 4 technologies in mitigating GE viz. chemical refining, refining at low temperatures, double refining and post-stripping at refinery.

Parameters	Crude Palm Oil	Chemical Refining	Standard Physical Refining	CPO Washing	CPO Washing + Double Refining	CPO Washing + Post Stripping
				Physical Refining	Physical Refining	Physical Refining
FFA	5%	0.05%	0.05%	0.05%	0.03%	0.03%
Phosphatides as Phosphorus	15 - 25 ppm	nil	< 5 ppm	< 1 ppm	< 1 ppm	< 1 ppm
Colour (5-1/4 ") based on CPO DOBI 2.3		2.1R	2.2R	2.0R	2.0R	2.0R
GE		< 0.5 ppm	3.2 - 4.5 ppm	3.2 - 4.5 ppm	< 0.3 ppm	< 0.5 ppm
3-MCPD		< 0.5 ppm	3.5 - 4.4 ppm	< 1 ppm	< 1 ppm	< 1 ppm
Yield		91%	95%	94.8%	93.8%	94.5%
*OPEX (RM/MT) <small>ONLY as Reference.</small>		~ 120	~ 45	~ 55.00	~ 105.00	~ 70.00

Options for Downstream.

SDO has reviewed several options (see Fig. 1) for mitigation and can choose CPO Washing + Post-stripping or Chemical Refining depending on the specifications to meet. Chemical Refining has higher OPEX than CPO Washing + Post-stripping.

Alfa Laval

Mr. Alexey Shevchenko’s paper was “Alfa Laval PalmFlex refining technology: reduction of GE and MOSH in refined palm oil”. The latest challenges of hazardous compounds in edible oils & fats are 3-MCPDE, GE and mineral oil hydrocarbons (MOSH & MOAH).

Alfa Laval offers the chemical refining route to produce NBD (Neutralised Bleached and Deodorised) oil for infant formula. The PalmFlex route offers a most optimum refining route with the following stages;

1. CPO washing, degumming & bleaching
2. Deacidification/Deodorisation
3. PalmFlex GE Stripping

to produce RBD oil low in GE (0.3 - 0.5 ppm), 3-MCPDE (< 1 ppm) meeting FFA, colour and blandness specifications.

MOSH (Mineral Oil Saturated Hydrocarbons) are mostly C20 & above ranging from 10 to 120 ppm in crude palm oil. It is coming mainly from operation malpractices. MOAH (Mineral Oil Aromatic Hydrocarbons) is lower than MOSH by a factor of 10. There is no EU legislation regulating the limits of MOH in vegetable oils and fats though large food companies are setting their own standards.

MOH pose potential health hazards in animal studies. For MOSH & MOAH C10-C24, high temperature deodorization with steam stripping and vacuum could reduce them. For C24-C30 only partial removal is possible. Good manufacturing practices is the best way to address this issue although food-grade lubricants could also be used.

Q&A

For this session Mr. Chia and En. Saiful were joined by Mr. Daniel Ng.



Speaker: Mr Daniel Ng.

Ir. Qua took questions first from participants who had sent in their questions based on the slides that were shared with them earlier. There were a dozen questions with 4 questions specifically for En. Saiful.

Questions came in during the webinar which was live on Facebook. There were about 15 questions. It was a very active Q&A session with all 3 panelists addressing most questions.

At the end of the webinar Ir. Qua reminded participants of the forthcoming Oils and Fats International Congress 2021 (OFIC 2021) from 15th June - 16th June 2021 at Hotel Istana, Kuala Lumpur. You can get more details at <http://mosta.org.my/ofic-2020/>

At the end of the successful webinar the moderator and speakers posed for a group photo with Tan Sri Datuk Dr Augustine Ong.



Group photo with Tan Sri Datuk Dr Augustine Ong.

Potential and Feasibility of Bio-Methane in Palm Oil Industry

IChemE POPSIG was glad to have Prof Ir. Dr Denny K.S. Ng from Heriot-Watt University Malaysia sharing the topic of Potential and Feasibility of Bio-Methane in Palm Oil Industry on 30th April 2021.

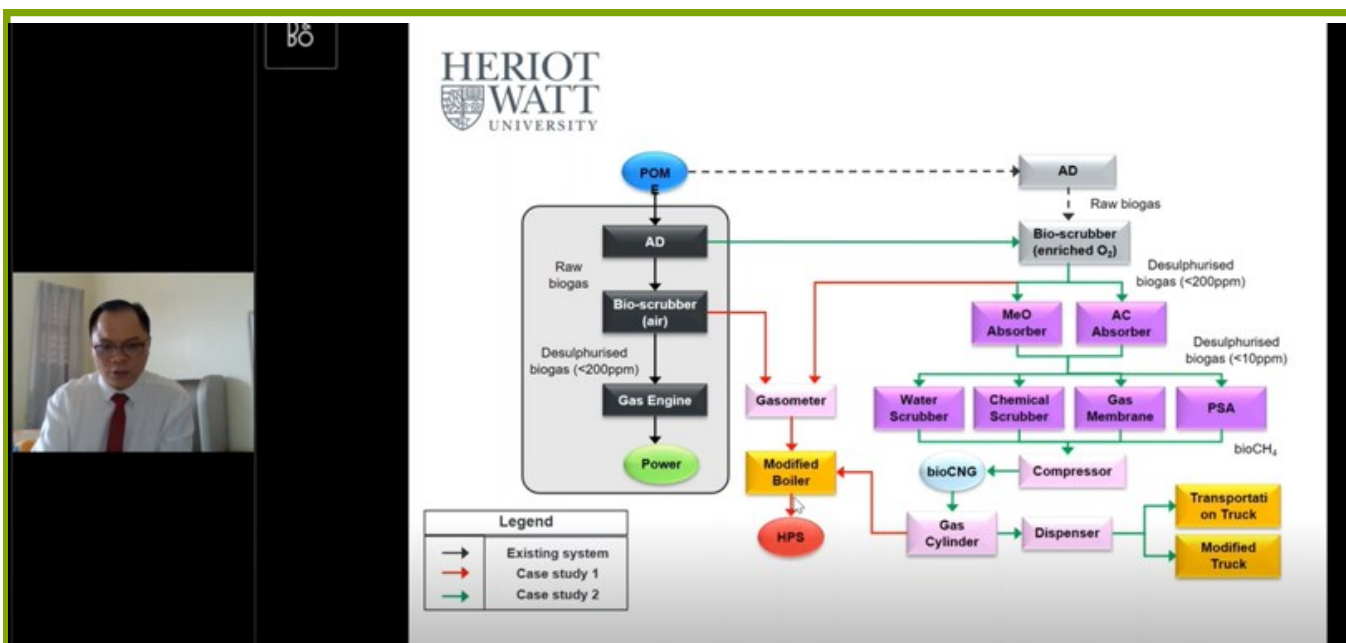
During his introduction, he gave some insights of the current market and export value of crude palm oil (CPO), also the price of CPO which have spiked from around RM 2000/tons to RM 4400/tons (29th April 2021) as mentioned in his sharing.

Some of the key sharing of day was how the biogas generated from palm oil mill effluent (POME) from palm oil mills can be utilized locally for other uses if FiT (Fed-in Tariff) Scheme is unavailable in some areas of the palm oil mills especially in East Malaysia due to lesser availability of national grid as compared to peninsular Malaysia. Aside from that, Prof. Den-

ny also covered some of the feasibilities questions for biogas production such as which is the best pathway and technology selection, the quality and quantity of the biogas from production, new or upgrading existing plant and finally the capital investment, operating costs and profit through his team's analysis carried out on their super-structure model (Figure below).

During the sharing, Prof. Denny also shared some examples of case study scenarios using the super-structure model to prove the sustainability of the bio-methane in palm oil industry.

Interested to have the full access to the webinar recording? Kindly Visit: <https://www.icheme.org/membership/communities/special-interest-groups/palm-oil-processing-sig/>



Super-Structure Model on the Feasibility Study of Implementation of Biogas Production by Prof. Denny and Team.

Enhancing the Way We Make Decisions in Energy Planning in Mathematical Models

On 19th May 2021, IChemE POPSIG was delighted to have our very own Deputy Chair, Dr Viknesh Andiappan (Heriot-Watt University Malaysia) in delivering the topic Enhancing the Way We Make Decisions in Energy Planning in Mathematical Models.

Dr. Viknesh's research area covers process systems engineering (PSE) and process integration (PI), which develop mathematical models for optimizing processes, systems and supply chains. Hence, throughout the content delivering, Dr. Viknesh helped participants to have a simple understanding of what mathematical models are. Apart from that, Dr. Viknesh also reviewed how mathematical models could be used for decision – making in the energy sector and the opportunities for mathematical models in energy planning and decision-making. This is because energy planning could lead to potential solution in integrating renewables and low carbon energy resources into energy sector (biomass, solar, hydrogen & etc.). Apart from that, mathematical models could help in energy efficiency improvement in energy demand management and energy storage. Both potential solutions through mathematical order would help curb the current issues of greenhouse gas emission.

By incorporating mathematical models, common issues faced in industry such as high investment cost, operational issues, finite resources, policy support and clear targets would aid in the process of decision making to solve them.

Are mathematical models reliable and trusted? Dr. Viknesh mentioned that mathematical orders are actually to support and gives insights for decision-making as the models helps estimates, understanding trends better, impacts of changes, patterns and behavior.

The webinar ends with an interesting live Q&A session, which wrapped up the event in 1 hour successfully. For upcoming webinar events and updates, welcome to check out IChemE POPSIG Website!

IChemE POPSIG Website:

<https://www.icheme.org/membership/communities/special-interest-groups/palm-oil-processing-sig/>

How can Mathematical Models help?

Mathematical Models

Used to Optimise and Aid Decision-making

Processes Supply Chains Policy & Economic Systems

As long as there are NETWORKS

Dr. Viknesh delivering the topic Enhancing the Way We Make Decisions in Energy Planning in Mathematical Models.

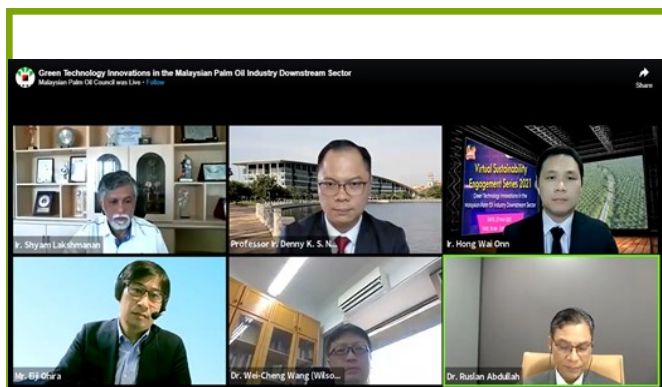
Malaysian Palm Oil Council (MPOC) Launches Science and Sustainability Engagement Series 1: Green Technology Innovations in The Malaysian Palm Oil Industry Downstream Sector

A science-based online platform named “Science and Sustainability Engagement Series” was recently launched by MPOC as an effort to deliver the latest developments to the palm oil industry stakeholders through the sharing of experts invited.

On 27th May 2021, the first 2 hours webinar series, titled “Series 1: Green Technology Innovations in the Malaysian Palm Oil Industry Downstream Sector Webina” was carried out with 302 online participants joining in and ended with a valuable live Q&A discussion.

Five honorable speakers were invited to share each of their expertise, researches and findings.

Below is the list of topics covered by the speakers:



Group picture with the speakers.

Presentation 1: Green Hydrogen as a Renewable Energy Source – Japan’s Perspective, by Mr. Eiji Ohira, Director General, Fuel Cell and Hydrogen Technology Office, New Energy and Industrial Technology Development Organization (NEDO), Japan.

Presentation 2: Sustainable Palm Oil Value Chain Based on Circular Economy Concept – with a Focus on the Downstream Sector, by Professor Ir. Dr. Denny Ng, Associate Head, School of Engineering and Physical Sciences, Heriot-Watt University Malaysia

Presentation 3: Green Opportunities in Enhancing the Sustainability of Malaysian Palm Oil Milling Sector – an

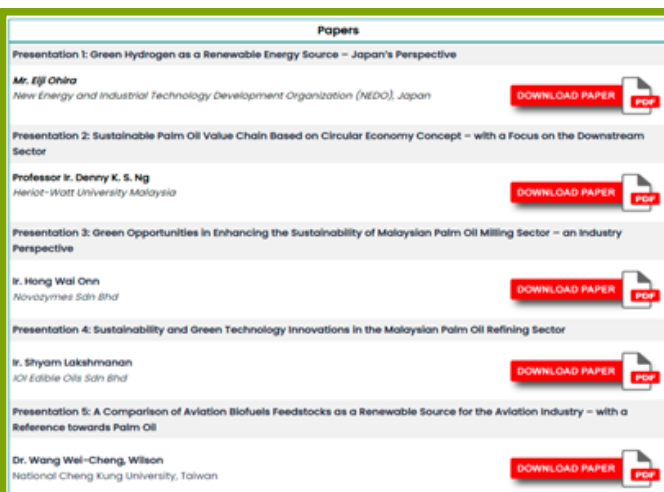
Industry Perspective, by Ir. Hong Wai Onn, Commercial Head, Novozymes Sdn Bhd.

Presentation 4: Sustainability and Green Technology Innovations in the Malaysian Palm Oil Refining Sector, by Ir. Shyam Lakshmanan, General Manager, IOI Edible Oils Sdn Bhd.

Presentation 5: A Comparison of Aviation Biofuels Feedstocks as a Renewable Source for the Aviation Industry – with a Reference towards Palm Oil, by Dr. Wei-Cheng Wang (Wilson), Associate Professor, Department of Aeronautics and Astronautics, National Cheng Kung University, Taiwan

The recording of the first webinar series can be obtained through MPOC Website, which comes with the downloadable presentation slides of speakers as well.

Link to Science and Sustainability Engagement Series 1:Green Technology Innovations In The Malaysian Palm Oil Industry Downstream Sector Webinar: http://mpoc.org.my/green-technology-innovations-webinar/?fbclid=IwAR1DbDzGRUdPrFRA_wlOb2Ha1-gqKfvPHicuTlZQ3_ZrZxeJ5Nt4Uxpla-Q



List of papers of topics covered by the speakers.

Malaysian Palm Oil Council (MPOC) Launches Science and Sustainability Engagement Series 2: Palm Tocotrienols

After a successful launch of the first Science and Sustainability Engagement Series by MPOC, on 2nd June 2021, MPOC hosted the second webinar series with 378 participants joining in the session which was moderated by Dr. Ruslan Abdullah, Director of MPOC's Science, Environment and Sustainability Division.

The event featured 3 key leading researchers in the field of tocotrienols who deliberated on the latest scientific development of palm tocotrienols and its marketing potentials.

Titles of presentation on 2nd June 2021:

Presentation 1: "Healthy Aging with Palm-Derived Tocotrienols" by Dr. Yap Wei Ney, Davos Life Science Pte Ltd, Singapore.

Presentation 2: "Benefits of Palm Tocotrienols in the Ag-

ing Brain" by Prof. Emeritus Dr. Yuen Kah Hay, Universiti Sains Malaysia.

Presentation 3: "Palm Tocotrienols: Immune-enhancing Potential" by Prof. Dr. Ammu K Radhakrishnan, Jeffrey Cheah School of Medicine and Health Sciences, Monash University Malaysia.

Missed out the live event? The second webinar playback and papers could be access with link below:

Science And Sustainability Engagement Series 2: Palm Tocotrienols Webinar:

http://mpoc.org.my/science-and-sustainability-engagement-series-2-palm-tocotrienols-webinar/?fbclid=IwAR3BzDT-drZ6MkcAT-k2eAoJBmqlLx39bQRD0461I_arShwg0Vz_mNcg0w0



Group picture with the speakers.

When Malaysia Embraces Net-Zero Carbon Emissions

As published in The Edge, June 7—June 13, 2021 by Ir. Qua Kiat Seng

**** Content Disclaimer:** The views and opinions expressed in this article is solely by the author and does not represent POPSIG and IChemE.

When what is said in the headlines happens, what does it mean for the palm oil industry in Malaysia? **Malaysia's commitment**

We need to start with the Paris Agreement which is a landmark in the multilateral climate change process because, for the first time, there is a binding agreement bringing all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects.

It was adopted by 196 Parties, including Malaysia, at the 21st Conference of the Parties (COP 21) of the United Nations Framework Convention on Climate Change Conference in Paris, on Dec 12, 2015. Its goal is to limit global warming to well below 2, preferably to 1.5°C, compared to pre-industrial levels.

To achieve this long-term temperature goal, countries aim to reach global peaking of GHG (greenhouse gas) emissions as soon as possible to achieve a climate-neutral world by 2050. As we are already at 1.2°C, the situation is becoming urgent, with some calling climate change a climate emergency.

At the Palm Oil Trade Fair and Seminar 2021 on Jan 5, Datuk Ravi Muthayah, secretary-general of the Ministry of Plantation Industries & Commodities, shared a presentation slide on what Malaysia has achieved (see graphic). You will note that Malaysia is committed to cutting the GHG emission intensity by 45% by 2030 relative to emission intensity GDP in 2005. As of 2013, 33% reduction has been achieved. To achieve the remaining 10%, we are waiting for climate finance, technology transfer and capacity building from developed countries.

Malaysia will cap palm oil cultivation at 6.5 million hectares (currently 5.9 million hectares or 18% of the total land area in the country). Some of these policies are being reflected in the working groups that are busy with the five yearly systematic review of the Malaysian Sustainable Palm Oil (MSPO) Standards (MS2530:2013 series and Supply Chain Certification Standard). The revised Draft MS 2530:2013 Series Standards is now available for public comment from May 1 to July 4.

Malaysia's Past Commitment Towards Sustainability



PARIS2015
ON CLIMATE CHANGE CONFERENCE
COP21-CMP11



Rio Earth Summit 1992
Local, national, and international action



SUSTAINABLE DEVELOPMENT GOALS

To cut the GHG emission intensity by 45% by 2030 relative to emission intensity GDP in 2005. As of 2013, 33% reduction has been achieved.

To retain at least 50% of the land area under forest cover. The area under forest cover in Malaysia is 55.3% .

Various environmental measures have been put in place while successfully uplifting the lives of rural communities through palm oil cultivation.

Source: Ministry of Plantation, Industries and Commodities.



Government's commitment towards policies for sustainable cultivation of palm oil

To cap total oil palm cultivated area to **6.5 Million hectares**



To **BAN conversion of permanent forest reserved area** for oil palm cultivation

4 Policies Towards Sustainable Oil Palm Cultivation

NO NEW planting of oil palm in **peatland** areas



To **make available oil palm plantation maps for public access** and to demonstrate further transparency in the supply chain

Source: Ministry of Plantation, Industries and Commodities.

COP 26 in Glasgow (Nov 1-12)

The Paris Agreement works on a 5-year cycle of increasingly ambitious climate action carried out by countries. By 2020, countries had to submit their plans for climate action, known as nationally determined contributions (NDCs). This has been delayed by the coronavirus pandemic.

In the meantime more than 126 governments around the world have made some sort of pledge on net-zero carbon emissions. It is already a law in some countries – for example, Sweden (by 2045), the UK (2050), France (2050), Denmark (2050), New Zealand (2050), Hungary (2050), China (2060) and Japan (2050). The US, the biggest CO₂-e emitter after China, has just rejoined the UNFCCC COP.

The US president hosted a virtual Leaders' Summit on Climate (April 22 and 23) as a prelude to COP 26. Malaysia was not invited, probably because it is not demonstrating strong climate leadership nor charting innovative pathways to a net-zero economy. Nevertheless, the country is not only vulnerable to climate change but can impact it as well.

COP26 is considered significant as it will be the first COP to take place after the Paris Agreement's measures take effect. Nations come together to review commitments and strengthen ambition as the urgency increases.

Malaysia's progress

In the last few months, the momentum towards addressing climate changes issues appears to have picked up. Tenaga Nasional Bhd declared that the Jimah electricity-generation facility, commissioned in 2019, is the last new coal-fired power plant in the country.

National oil corporation Petroliaam Nasional Bhd (PETRONAS) has pledged net-zero aspirations by 2050. Renewal energy has gone from 2% in 2008 to 10% against the 20% target in 2025. The recent LSS4 (large-scale solar package) award by the Energy Commission has increased this by 3%. Hopefully, there is more news in the pipeline in the build up to COP26.

It is inevitable that Malaysia will embrace net-zero carbon emissions. It is better to do it earlier rather than later as remedial costs are very high. Jimah will retire in 2033. Retrofitting it for CCUS (carbon capture, utilization and storage) is very expensive and carbon capture technology exacts an "energy penalty" of 25% to 40%.

The transition requires, besides political will, massive structural and legislative reforms. The process will involve all stakeholders and industry, not just the palm oil industry which sometimes has borne the brunt of uninformed accusations. Amongst other things it should become clear how forests (if any) and land should be used for development.

The palm oil industry

The palm oil industry recognizes the impact of climate change. With the rise in temperature, incidences related to water stress may become more prevalent. During times of drought, oil palm yield suffers significantly. Unusually long periods of flooding have also negatively impacted on the supply because of harvesting difficulties.

The palm oil industry is quite well placed to meet the challenges of net-zero carbon having made an early start with the Roundtable on Sustainable Palm Oil (RSPO) in 2004. Many initiatives have been undertaken in the palm oil industry by the public as well as private sector.

1. Under Malaysian Palm Oil Board (MPOB) licensing effective Jan 1, 2014, new mills are required to trap/avoid methane gas emissions from palm oil mill effluent (POME). By 2019, 125 palm mills out of 452 had biogas plants, with 30 connected to the national electricity grid. This is green electricity.
2. The current MSPO Standards review will bring it up another notch in the sustainability ladder. As Malaysia's commitments are legislated this will facilitate "shared responsibility" not only across the palm oil sectors but across all industries.
3. As palm biodiesel is a renewable source of energy we can look forward to a marked increased use of palm biodiesel in Malaysia to meet its carbon-zero emissions goal. Increasingly, low quality palm oil recovered from POME (about 2 – 3%) is being converted to value added biodiesel and at the same time assuring the high quality of CPO (crude palm oil).
4. Oil palm biomass will be in demand as the second-generation biofuel. This will be not only for palm kernel shells (PKS) and palm mesocarp fibres (PMF) but also the less-easy-to-use empty fruit bunch (EFB). The palm mill is an excellent example of a self-sufficient production unit in terms of energy when it uses its own biomass and biogas. We can then consider such a mill to have net-zero carbon emissions. We may see the revival of the production of bio oil using biomass-to-liquid technology as per Entry Point Project 7 (EPP7) of the Palm Oil National Key Economic Area that was shelved in 2018.
5. The combined palm/palm kernel oil yields is nearly six times the next highest vegetable oil on a per hectare basis. Yet, palm oil yields have continued to increase from four tonnes per hectare to at least 10 tonnes based on the work of MPOB and the private sector. The carbon

footprint per tonne of palm oil continues to go down. Much work is also going on to reduce palm oil loss at the mill. The industry uses the term "oil extraction rate" (OER) and in Malaysia, this is between 19 to 21%. Based on the global production of palm oil in 2018, approximately three million tonnes of additional palm oil can be produced globally with a 1% increase in OER. Conversely, in both instances less land will be required.

6. The industry has availed itself of digitalization across all sectors. Currently, it is widely used for production management, improving efficiency, reducing cost and increasing productivity. A 3-4% increase in OER as a result has been claimed. The potential for the use of data analytics in processing remains to be tapped, with the downstream sector most ready to do so and apply it, for example, in heat integration.

Climate change is now a climate emergency and it is good to see the two largest contributors - China and the US - coming on board. Having said that, no country is spared from the effects of climate change, and the contribution from every country, no matter how small, is needed.

We can expect Malaysia to join the 126 or more countries in embracing net-zero carbon emissions. It will take strong political will in these difficult times, but it better to do so earlier rather than later.

The palm oil industry is in a good position of having started on its sustainability journey, which is inevitably tied to climate change, as far back as 2004. The MSPO is a key vehicle for this as it gains momentum and shortly crosses the 90% planted area certification milestone. The palm oil industry can seize this opportunity to rebrand its sustainability story that net-zero carbon present.



Ir. Qua Kiat Seng

Senior Lecturer

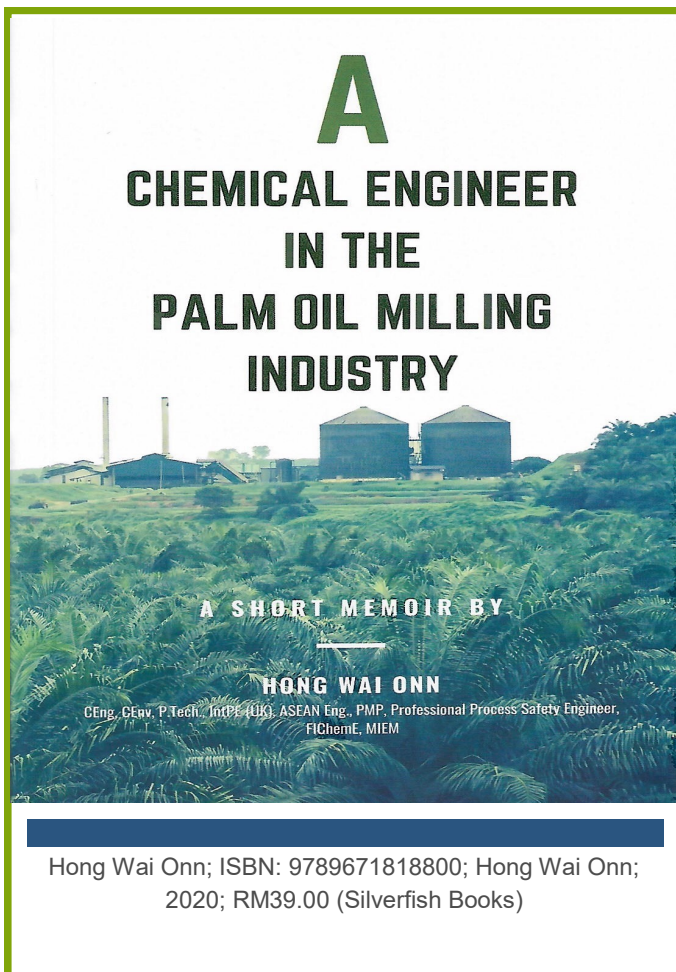
Ir. Qua Kiat Seng is a Senior Lecturer at Monash University Malaysia and a fellow of Monash-Industry Palm Oil Education and Research (MIPO) Platform. He is also a member of the working group for the review of the MSPO Standards (MS2530:2013).

References

1. K. S. Qua, My Say: When Malaysia embraces net-zero carbon emissions, 2021, Edge Weekly, <https://www.theedgemarkets.com/article/my-say-when-malaysia-embraces-netzero-carbon-emissions>

Book Review: A Chemical Engineer in the Palm Oil Milling Industry

**** Content Disclaimer:** The views and opinions expressed in this article is solely by the author and does not represent POPSIG and IChemE.



This book is essential reading for anyone entering the palm oil industry at any level, from an undergraduate to a manager, no matter what their qualification and training is. The author's writing style makes for easy comprehension of scientific and engineering aspects of the palm oil mill, an understanding of which will enhance the work they do in the palm oil industry.

What's in this book?

The first thought of this book is comparable to Perry's Chemical Engineers' Handbook, the definitive reference. Or Mahbob Abdullah's Planter's Tales that takes you into oil palm plantations deep in the jungles of the equator. Or Eliyahu Goldratt's The Goal, a novel of ongoing improvement in the factory. Or Bailey's Industrial Oil and Fat Products, the standard reference on the chemistry and processing technology of edible

oils and fats. This book has aspects of all these outstanding works.

Starting from nowhere

Upon graduation as a chemical engineer or process engineer which is often a more apt description, the author joined Genting Plantations in Sabah and began his career in the palm oil milling industry for the next decade or so. A mill is often located remotely and so is self-sufficient. Such conditions build character and set the scene in developing himself as a professional engineer to solve problems and make improvements applying his knowledge hands on.

The science

In the palm oil industry processing begins at the mill and in the earlier two thirds of the 30 short stand alone chapters, the author covers the unit operations (process building blocks) in the mill. For the uninitiated he provides clear non-technical description and his personal wisdom. For the chemical engineering undergraduate he shows where science and engineering principles are practiced. These include Dalton's Law, Stokes' Law, mass balance, heat transfer, fluid mechanics and thermodynamics.

Process Safety

As with any consummate chemical engineer process safety and sustainability is the author's priority. He devotes chapter 15 to process safety which he inculcated in a sector that was just beginning to grasp it. He had to put in some effort to convince his peers to move from personal safety to process safety management.

Sustainability

Sustainability is a recurrent theme in the book. He applied mass balance to understand how to increase mill oil extraction rate as every percentage point increase not only increases the profit but also reduces the hectareage of land required to grow oil palm trees.

The heart of his mill is the steam boiler which fueled by biomass of pressed mesocarp fibres and palm kernel shells. When the boiler is coupled with a steam turbine it produces sustainable energy. The author describes how he nervously first synchronised a steam turbine to the running electricity network.

The mill uses a lot of water not only for the steam boiler but also for processing. This results in wastewater known as POME (palm oil mill effluent). Treated POME is rich in nutrients and can be utilised as fertiliser in the oil palm plantation. Here the author went 'beyond the fence' to design and commission a land application and irrigation system using treated POME. Today such a practice could be popularly called regenerative agriculture.

A Leader

In the last thirds of the book before he covers the future technological development of the palm oil industry, he shares how he had developed as a manager, not only of processes but of people, into a leader. From ISO (International Organisation for Standardisation) he adopted a methodology of "Plan-Do-Check-Act" (PDCA) that has served him well.

He is well read, a habit likely refined during the weekends when he was holed up in a remote mill. He emphasizes the value of soft skills and provides many examples of working with people. Ethics will confront many people in their career and he is not afraid to tell how he dealt with it.

He finds time to volunteer for the Institution of Chemical Engineers in Malaysia with some time devoted to nurturing chemical engineering undergraduates. The palm oil mill is not the only sector they can work in and he suggests that there are a variety of roles in the palm oil industry that they may not be aware of.

The future

Acknowledging that the mill has to move forward the author provides some possibilities. In waste to wealth he discusses tapping biogas generated from POME for energy dubbing the palm oil industry as the new oil and gas industry.

Biotechnology is well established in the plantation sector particularly in breeding of oil palms but it will also have a place in the processing of palm oil. Enzymes is a green game changing technology that can be applied to the palm oil extraction process not only to improve the rate but to minimise the use of water. It will also enable palm oil sludge that is abundantly available to be converted in a single step to biodiesel. The author hints that there are other possibilities waiting to be explored.

The author observes that the palm oil milling industry needs to change and embracing Industry 4.0 will be paramount. He provides promising examples of where this is already happening.

Recommendation

The author classifies his book as a short memoir. It is actually a text book with an index and references in each chapter are fully listed. This book should be stocked in university libraries as a reference for the teaching and learning of the palm oil industry. Mill managers will find it a useful aid to induct new recruits.

Appreciation

We should be grateful to the author for his fortitude, dedication and passion in writing this book. As he is in full time employment and regularly volunteers for his profession, the effort he has put in to pave the way for entry into the palm oil industry must be lauded. This is the first time I have seen an individual acknowledgement of all the people involved in a career.

Summary

Palm oil is a big business. Palm oil has been widely used in food and non-food industries. More than half the products on sale in supermarkets are made with palm oil—yet many people hardly know anything about this industry. They do not even know chemical engineers have a significant role to play in this industry. This book provides a series of episodes for you to discover the opportunities chemical engineers have in the palm oil milling industry. You do not have to be a chemical engineer or even work in this industry to enjoy this book. The insights are just as valuable for any discipline.

Article by Ir. ChM Qua Kiat Seng CEng FIChemE

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Senior Lecturer

Ir. Qua Kiat Seng is a Senior Lecturer at Monash University Malaysia and a fellow of Monash-Industry Palm Oil Education and Research (MIPO) Platform. He is also a member of the working group for the review of the MSPO Standards (MS2530:2013).

References

1. W. O. Hong, 2020. A Chemical Engineer in the Palm Oil Milling Industry, Silverfish Books, Malaysia, ISBN: 9789671818800.

In Defense of Palm Oil: Why We Should Be Supporting the Industry's Move Toward Sustainability - Not Demonizing It

As published in Next Billion, 2021 by Robert Hii

**** Content Disclaimer:** The views and opinions expressed in this article is solely by the author and does not represent POPSIG and IChemE.

I read Jim R. Richards' op-ed "The Ecological Disaster of Palm Oil: Why It's Time to Embrace Climate-Friendly Alternatives" on NextBillion, and had to respond.

The article made it sound as if all of humanity's problems would be solved if we would stop using palm oil. That opinion was so far from the truth that I felt compelled to present some facts on palm oil. The reality is far more nuanced than Richards' article claims.

PALM OIL'S ONGOING MOVEMENT TOWARD SUSTAINABILITY

One part of Richards' argument is accurate: Back in the early 2000s, as palm oil producing countries – especially Malaysia and Indonesia – expanded growing areas to meet a booming global demand, forests were cleared with no concerns for the consequences. Indeed, when the World Resources Institute (WRI) wrote this blog in 2011, the popular narratives about palm oil's role in land conflicts and wanton deforestation might have been completely true.

But in response to WRI and other global voices that protested the industry's practices, the Roundtable on Sustainable Palm Oil (RSPO) was formed, with the mission to create a model for sustainable palm oil production. The RSPO is now a dynamic business-to-business scheme providing palm oil buyers with the assurance that producers are maintaining sustainable practices.

The RSPO came under criticism for failing to mitigate unsustainable practices by palm oil producers and (allegedly) working with plantation companies to conceal violations of the RSPO Standard. But whatever its failings, as someone who has worked to hold the RSPO accountable by challenging its members who violate group principles, I have to admit that the organization deserves credit for having sparked the drive towards producing palm oil sustainably. This drive toward sustainability has been picked up by palm oil producing countries, leading to the launch of national certification schemes, including Malaysian Sustainable Palm Oil (MSPO). The MSPO certification scheme has raised the stakes for these efforts, providing a mandatory certification that requires every drop of Malaysian palm oil to be certified as sustainable.

Due to these initiatives, great strides have been taken to address the need to balance development with conservation. But no one has to take the word of the palm oil industry about its moves toward sustainability. Apps released by the RSPO and the MSPO have made it possible for anyone with a smartphone to track the industry. The Malaysian Palm Oil Council is even adopting blockchain technology to further improve transparency. These tech moves are a direct challenge to critics who say the sector has something to hide.

Efforts by the RSPO, MSPO and others have had additional positive impacts, protecting biodiversity and empowering local communities. This can be seen in companies like Sime Darby, one of the largest palm oil producers in the world, which has provided deep funding through the Sime Darby Foundation to preserve biodiversity in places where it works, while making meaningful charitable contributions to local communities.

The scientific community has taken note of this progress, including the University of Gottingen, Germany, which released a report this year finding that "the rapid expansion of oil palm has also contributed considerably to economic growth and poverty reduction in local communities, particularly in Asia."

THE HUMAN SIDE OF THE STORY ON DEFORESTATION AND PALM OIL

Despite these developments, the palm oil industry faces a big challenge in telling the other side of the story: how it is bringing better livelihoods to impoverished people in developing countries. The fact that so many people in these countries live on less than a dollar a day may be of little interest to some environmental activists. But the economic benefits of the industry aren't as easily overlooked by impoverished communities themselves.

The Dayaks of Malaysian Borneo, whose loin-clothed men and topless women were once a popular subject for photographers, are a prime example of this. Their struggles for indigenous rights have not been easy. Where they once had to deal only with land conflicts and discrimination at home, they now have to fight criticisms of the industry that provides many of them with employment, from outside activists who they consider to be antagonists from faraway places.

To take one example, in this press release the Dayak Oil Palm Planters Association went as far as saying that “discrimination against palm oil is discrimination against indigenous peoples who depend on the crop for empowerment.”

This was a rare pushback by these small farmers, many of whom I've met in my travels researching the palm oil industry. The Dayak oil palm farmers that I know as friends are far too busy working their farms to spend much time on public relations campaigns. But despite the challenges they face, the Dayak culture remains strong, marked by their traditional longhouses and the community spirit that brings extended families together to maintain their farms. Picking out which families are oil palm farmers is easy enough. One need only look for the longhouses with a satellite dish overhead – or for the more enterprising, a 4X4 parked in front. In these farmers' opinion, they have as much of a right to these signs of progress as anyone else.

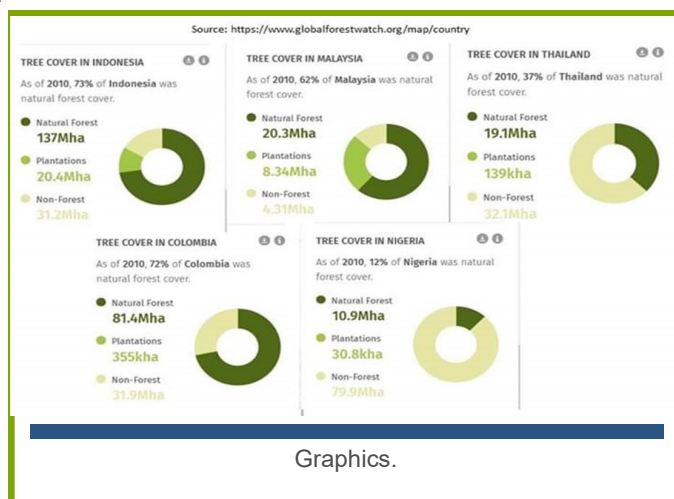
SUPPORTING THE PALM OIL INDUSTRY'S MOVE TOWARDS SUSTAINABILITY

Yet as much as producers and other stakeholders in the industry may gripe about the “black campaigns” conducted by international NGOs against palm oil, my view is that they should thank the alarmists and environmental groups for pushing this commodity toward greater sustainability.

That sense of gratitude should be shared even by the organizations and activists that oppose the industry in the hopes of saving orangutans in Malaysia and Indonesia, as the growing sustainability of palm oil production has boosted the preservation of the great ape and its habitat. The governments of both Malaysia and Indonesia – the countries where the orangutan's habitat is located – have accelerated these efforts, while making substantial investments in direct funding for sustainable palm oil certification programs that enable farmers to continue their work while also protecting wildlife.

In fact, ironically, if Malaysia and Indonesia were to ban palm oil as many of the industry's critics demand, the result would likely be worse for orangutans and other endangered species. According to Matin Qaim, an agricultural economist at the University of Göttingen and the first author of the study cited above, “... banning palm oil production and trade would not be a sustainable solution. The reason is that oil palm produces three times more oil per hectare than soybean, rapeseed, or sunflower. This means that if palm oil was replaced with alternative vegetable oils, much more land would be needed for cultivation, with additional loss of forests and other natural habitats.”

Producing palm oil sustainably is the only sure-fire way to save the orangutans and their forests. However, this requires the presence of stakeholders with a vested interest in saving them. The solutions proposed by critics like Jim R. Richards would only have a negative influence on their preservation.



Agriculture is a contributor to climate change, deforestation, biodiversity loss and other environmental problems around the world. But farmers and other industry players must be engaged as part of the solution to these crises – not portrayed as the villains. As the International Union for Conservation of Nature reported, saying no to palm oil would merely increase the production of other crops to meet the global demand for oil, displacing rather than halting the biodiversity losses caused by the palm oil industry. No one should make the false assertion that they will be saving the planet when they reject products that use palm oil.



Robert Hii

CSPO Watch Owner

Robert Hii was born in Sarawak, Malaysian Borneo, and later moved to Canada. He returned to Malaysia when he saw the need to raise awareness of the importance of biodiversity and the role that palm oil was playing. He has worked extensively with industry stakeholders including conservation groups and smallholders as part of his mission to find an equitable definition of sustainable palm oil.

E-mail address: robert@cspo-watch.com

References

1. R. Hii, 2021. In Defense of Palm Oil: Why We Should Be Supporting the Industry's Move Toward Sustainability – Not Demonizing It, Next Billion, <https://nextbillion.net/palm-oil-sustainability-agriculture-tech-environment/>

Can Palm Oil Truly be Sustainable? Malaysia Offers a Certification Model We've been Waiting For

As published in The Parliament Magazine, 11th May 2021 by Robert Hii

*** Content Disclaimer: The views and opinions expressed in this article is solely by the author and does not represent POPSIG and IChemE.*

The Malaysian Sustainable Palm Oil (MSPO) certification is redefining the responsible supply chain from producer to consumer, writes Robert Hii.

A new UN report entitled, "Making Peace With Nature", finds that nearly 90 percent of all known species are threatened by climate change. Another UN report warns the world is "nowhere close" to fighting climate change. Unsurprisingly, panicked governments are adopting short-sighted solutions, and in the process are missing important templates for slowing, and even reversing, climate change.

Malaysia offers such a template; as a leading palm oil producer, the country's progress towards sustainability deserves to be both widely studied and rewarded with robust trade agreements. The key to its success in slowing deforestation has been - if not solely, at least in part - due to its nationally mandated certification scheme, Malaysian Sustainable Palm Oil (MSPO).

Unlike the Roundtable on Sustainable Palm Oil (RSPO), which is supported by companies and founded on voluntary adherence, the Malaysian government enforces this nationally mandated, government-backed sustainability metric with penalties and sanctions. Further, the MSPO provides a greater focus on smallholder farmers and on preventing deforestation.

Given its corporate focus, the RSPO scheme is difficult for smallholder farmers to navigate, despite the fact that they make up, worldwide, about half of all palm oil landholdings. The RSPO is also very expensive, making it even more burdensome. This is something the MSPO has been able to overcome by being more accessible; the fact that almost all organised smallholders in Malaysia are MSPO certified speaks for itself.

In fact, in the year since it became mandatory, 87 percent of Malaysian producers were certified under the MSPO. That includes nearly all organised smallholders and plantation companies and 39 percent of independent smallholders.

Recently, the World Resources Institute found that, over the

last four years, Malaysia's rate of deforestation has decreased annually. This could possibly be a result of Malaysia's forest management and conservatorship, which includes tougher law enforcement and mandatory moratoriums.

Another aspect in which the MSPO differs from other certification schemes is in its commitment to wildlife protection, leading in the conservation of endangered species (Malaysia has one of the most biodiverse ecosystems in the world). In its capacity of creating a nationwide conservation landscape, MSPO offers the chance to protect particularly vulnerable species. That includes the pygmy elephant and Bornean orangutan, two beloved animals.

In fact, the palm oil sector has been funding several conservation projects throughout Malaysia, ensuring that humans and wildlife coexistence. For example, under the MSPO - and contrary to widespread misperception of the palm oil industry - fragmented forests have been reconnected, to the benefit of endangered orangutans. A recent study by 'Frontiers in Forests and Global Change' underscored the importance to Malaysia's orangutan population of such efforts.

What makes the MSPO a model for global sustainability is its capacity to contribute to a nationwide conservation landscape to protect its natural landscape and endemic wildlife species. The Malaysian palm oil industry, with the backing of the Ministry of Primary Industries and the Ministry of the Environment and Water, has effectively created a model of sustainable development.

Extraordinary programmes to protect endangered wildlife and habitats have the support of multinationals such as Unilever and Nestle, both of which have committed to sustainable palm oil production in Malaysia. In addition, project-specific funding from the Malaysian Palm Oil Green Conservation Fund and foreign NGOs, including Panthera from the US and Orangutan Appeal UK, have been instrumental in preserving wildlife species in Malaysia.

Instead, Malaysia continues to face obstacles in enforcement and could greatly benefit from collaboration with global experts in relevant fields. That is help the EU is uniquely positioned to offer. Sustainability, after all, is not only an environmental issue but an economic one; competition for land and agricultural expansion is often motivated by a hope among smallholder farmers of lifting themselves out of poverty.

This is precisely what Malaysia has witnessed since the rapid expansion of palm oil production in the 1960s, due to increased demand for palm oil by Western consumers. The fates and fortunes of these smallholder farmers were front and centre during the formulation, and now the enforcement of, the MSPO; namely, a concern for the human rights of local workers and of indigenous communities.

Today, the MSPO contains robust regulations on sustainability, conservation, human rights, and labour and women's rights. While there is always room for improvement, the government of Malaysia has been highly responsive to breaches of MSPO regulations.

During my visit to palm oil plantations in Sarawak, Malaysia, a few years ago, I was impressed by the measures taken to ensure fair living standards for migrant workers and their families. While no certification scheme is perfect, the willingness to make the MSPO as close to ideal as possible exists on the ground.

However, to develop and advance sustainability certifications for forest risk commodities such as palm oil, a focus on smallholder farmers is important, as is a consideration of the effects of European consumer demand. This process cannot be one-sided. Questions about how to achieve long-lasting palm oil sustainability cannot be adequately answered without a dialogue with producer countries as well as incentivisation by the EU.

Regrettably, although there has been some increase in the EU's awareness of sustainable palm oil and MSPO, there still is not enough understanding of the metric or of its successes. In fact, Global Policy magazine found that progress in MSPO certification is "double the EU's outdated estimate," resulting in a certification process that is "far more substantive" than EU policymakers currently recognise. Remedying this shortcom-

ing is a critical priority; after all, as a University of Bath study published in Nature Sustainability found, banning palm oil, as the EU has done, would actually increase deforestation.

Reducing palm oil production would not see consumer demand evaporate, but rather migrate to alternative oils, such as soy, sunflower and rapeseed, which are far less efficient. Palm oil is less costly, both monetarily and environmentally.

The MSPO holds the potential to truly transform supply chains, not only for the palm oil sector but for all forest-risk commodities. That said, the ability to tap into its full potential to eradicate deforestation, in Malaysia and globally, lies in the willingness of trade partners such as the EU to invest in, and strengthen, the certification. The zero-deforestation commitments make the EU and Malaysia natural partners - as long as both parties are willing to listen to and learn from each other.

This article was published as part of the Sustainability First supplement by the Center for Sustainable Palm Oil Studies (CSPO). The full supplement is available on: <https://www.theparliamentmagazine.eu/magazine/issues/sustainability-first-supplement>



Robert Hii

CSPO Watch Owner

Robert Hii was born in Sarawak, Malaysian Borneo, and later moved to Canada. He returned to Malaysia when he saw the need to raise awareness of the importance of biodiversity and the role that palm oil was playing. He has worked extensively with industry stakeholders including conservation groups and smallholders as part of his mission to find an equitable definition of sustainable palm oil.

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References

1. R. Hii, 2021. Can palm oil truly be sustainable? Malaysia offers a certification model we've been waiting for. The Parliament Magazine, <https://www.theparliamentmagazine.eu/news/article/mspo-sustainable-palm-oil-redefined>

Myths We Have All Heard About Palm Oil

by Kreena Bhavin Gada

Kreena Bhavin Gada from University of Nottingham Malaysia had won the POPSIG Honorarium Best Article for writing this article.

Since its introduction to the US Market in the 1980s, where soy bean oil is commonly used for cooking, the palm effect on health has been a source of conflict¹.

Even though palm oil is commonly used in palm oil-producing nations such as Indonesia and Malaysia, it has been characterized as “unhealthy” and “hazardous” in the years subsequently¹.

It didn't take long for palm oil producers to promote and develop a volume of studies refuting these assertions, leading to consumer confusion that persists today. Presently, the best answer to the question of whether palm oil is unhealthy or healthy is probably “it depends”¹.

Due to the consumer confusion, there are many myths about palm oil therefore presented below are some of the main misconceptions and the corresponding truth about palm oil on health:

1. Palm oil and its derivatives are unhealthy due to their high saturated fat content

When compared to other plant oils like sunflower oil and olive oil, palm oil contains more saturated fat². Overconsumption of saturated fats, which is quite common in animal fats, can raise total blood cholesterol levels, which leads to the increase in the risk of a heart disease³.

It does, however, include mono-unsaturated fats and small portions of polyunsaturated fats, which are typically regarded as “healthy” fats that can help lower blood cholesterol and also reduce the risk of heart disease. As a result, nutritionists and scientists perceive palm oil's influence on human health cholesterol levels as neutral.

Palm oil differs from palm kernel oil, which contains roughly 80% saturated fats², as per Malaysian Palm Oil Council (MPOC). “Palm oil is mostly utilized for food purposes, whereas palm kernel oil is mostly intended for non-edible reasons such as manufacturing of detergents, soaps and cosmetics,”

according to MPOC's frequently-asked question page on palm oil¹.

2. Palm oil can become toxic when used to fry food

Palm oil is a naturally stable plant oil which can withstand temperatures ranging from 160⁰C to 200⁰C in the frying pan. Palm oil has been discovered to keep its chemical structure at extremely high temperatures, making it useful for baking and frying⁴.

One of the chemical mechanisms that causes oil to go bad is oxidation and hence even at elevated temperatures, the oil too can resist oxidation⁴.

3. Palm oil isn't healthy because it's made up of 50% saturated fatty acids

Palm oil is abundant in vitamin E and carotenoids², in addition to fatty acids. Carotenoids are naturally occurring pigments in plants that serve as antioxidants when consumed. Palm oil is highly concentrated with alpha and beta-carotene. These two types of carotene can be processed by the human body to make vitamin A – the vitamin that is necessary for a good vision and a stronger immune system¹.

Vitamin E which is also present in palm oil has some antioxidant properties as well. Although, frying foods with palm oil on a regular basis may reduce the levels of the mentioned nutrients it contains¹.

Conclusion

Palm is good for health as long as it consumed in the right quantities. Furthermore, palm oil is not just saturated fatty acids, rather it contains useful vitamins such as vitamin E and also pigments such as carotenoids that are useful for our body. Finally, it is okay if palm oil is heated to high temperatures as it still keeps its chemical composition and hence not toxic for the human body.

References

1. 2014. Debunking the common myths about palm oil. The Star July 27, 2014. Available: <https://www.thestar.com.my/lifestyle/health/2014/07/27/much-ado-about-palm/>
2. 2017. Palm Oil vs. Palm Kernel Oil. Eating Well. Available: <https://www.eatingwell.com/article/290687/palm-oil-vs-palm-kernel-oil/>
3. American Heart Association. 2017. Trans Fats [Online]. Texas. Available: <https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/fats/trans-fat>
4. Marco, D. E., Savares, M., Parisini, C., Battimo, I., Falco, S. & Sacchi, R. 2007. Frying performance of a sunflower/palm oil blend in comparison with pure palm oil. European Journal of Lipid Science and Technology 109, 237-246. Available: <https://onlinelibrary.wiley.com/doi/abs/10.1002/ejlt.200600192>

Congratulations!



Prof. Dr. Robiah Binti Yunus

We are thrilled to note that ex-committee member and POPSIG member Prof Dr Robiah binti Yunus has been recently promoted to the Deputy Director General of Higher Education (Academic and Development). She had supported IChemE Malaysia as a facilitator for workshops on Technical Roadmap for Chemical Engineering.

Prior to her current position, Prof Dr Robiah has served as the Director at the Institute of Plantation Studies (IKP). She has more than 35 years of experience lecturing Chemical Engineering courses at Universiti Teknologi Malaysia (UTM) and Universiti Putra Malaysia (UPM), where she received her PhD in Chemical Engineering in 2003. Furthermore, she has supervised 109 post-graduate students regarding various design and final year research projects.

To date, Prof Dr Robiah has led more than 24 public and private research initiatives that involve grants totalling RM18.8 million. Her latest research grant of RM2.8 million from MESTECC allowed her to fabricate and commission a 5-ton/hr newly invented palm oil extraction machine (micrones). Her research has led to 320 journal publications — 221 in Scopus — with a total citation of more than 5350 citations (Scopus). The POPSIG committee looks forward to and wishes her the very best in her future endeavours.

Author and chemical engineer Hong Wai Onn is ecstatic and honoured to announce that the Court of Aldermen has recently passed an order for his admission to the Freedom of the City of London in The Worshipful Company of Engineers. The admission ceremony was held virtually on June 17, 2021. The Freedom of the City of London dates back to 1237 and is offered to individuals to celebrate a significant achievement. We are delighted to congratulate our fellow POPSIG Executive Committee for being recognised with the prestigious Freedom of the City of London for his achievements in chemical engineering and palm oil processing.

Based out of Kuala Lumpur, Malaysia, Hong Wai Onn is a chartered chemical engineer and a Fellow of the Institution of Chemical Engineers. Earlier this year, he was admitted as a Freeman of the Worshipful Company of Engineers. He is a passionate advocate who believes in harnessing science, technology, engineering, and mathematics to advance the development of the palm oil processing industry by ensuring the greater participation of young people. Being recognized by this distinguished acknowledgement, he stated, "I'm honoured to become a Freeman of the City of London as it marked a milestone achievement in my professional career as an engineer. It is also the greatest symbol of my respect for the City of London that I have honoured and welcomed in this way."



Ir. Hong Wai Onn

Hong Wai Onn has been working relentlessly to boost the industry of palm oil processing, having written a boon on the aforementioned topic that has been acknowledged as one of the best and longest palm oil mining memoirs in Malaysia. His expertise in the biotechnology and palm oil industry for over 15 years has allowed him to implement innovations and ideas in the practical scope. As an author and a public speaker, his ideas and innovations are salient components in the palm oil industry. With the new recognition, he sets to embark upon a new journey in his professional life. To know more about him, visit his website at <https://hongwaionn.com/>.

MCY 2020 Award

Super Coagulant Developed by DIA-Chemical Sdn. Bhd. Suitable for Palm Oil related Effluent Treatment Won Commercial Deal Award, MCY 2020.



The MCY 2020 Award Trophy.

of sequential batch reactor (SBR). It uses self-sustained energy generated from the exothermic process to complete the reaction cycle. The super coagulant comes in four series: DIA-CHLORTM aluminium chlorohydrate, DIACHLORTM polyaluminium chloride Type 1, Type 2 and Type 3.



Picture of the super coagulant.

They are water and wastewater treatment chemicals having higher efficiency because they have longer polymer chains. Today, they are widely applicable in various palm oil-related industries, especially for biodiesel, fatty chemical, and refinery effluent treatment. They enhance oil removal efficiencies and improve oily sludge separation.

Malaysia Year of Commercialization Award (MCY 2020) — organized by the Ministry of Science, Technology and Innovation — was presented to DIA-Chemical Sdn. Bhd. on 17 December 2020 under the Commercial Deal category. The award was virtually presented by the Minister of Science, Technology and Innovation — Khairy Jamaluddin, at the MCY 2020 Summit to recognize the achievements of local researchers and entrepreneurs who have successfully commercialized their development and research (R&D) products in local and international markets in the year 2020. A total of six award categories were presented, with the winners receiving cash prizes totalling RM1 million along with trophies and certificates of appreciation.

DIA-Chemical Sdn Bhd is a one-stop solution for sustainable water and wastewater treatment that has been in business since 2006. Over the past 14 years, DIA-Chemical has been advancing and influencing the water and wastewater treatments industry by providing innovative solutions and services.

The super coagulant DIACHLORTM aluminium chlorohydrate, was produced using the in-house developed novel technology



Group picture with the Minister of Science, Technology and Innovation.

Final Year Design Award 2020

IChemE Palm Oil Processing SIG annually awards Best Final Year Design Award to a group of final-year students whose final-year project design revolves around palm oil processing. This year, POPSIG is delighted to announce that a student-led team from Heriot-Watt University Malaysia (HWUM) won POPSIG Best Final Year Design Award 2020. The title of the project was "Monetisation of Palm Oil Mill Effluent (POME) into Renewable Energy and Green Chemicals".

"It was a great opportunity and experience to participate in this competition, as it raises awareness to student to a real-world problem. I want to thank all my teammates and supervisors for the consultation and guidance throughout this project." - Gong King Sean, team member.

"I appreciate the university and IChemE for providing us the opportunity to participate in the design competition, it was really a great experience to take part in the project related to the palm oil and the renewable energy industry." - Bryan Mah Jun Y, team member.

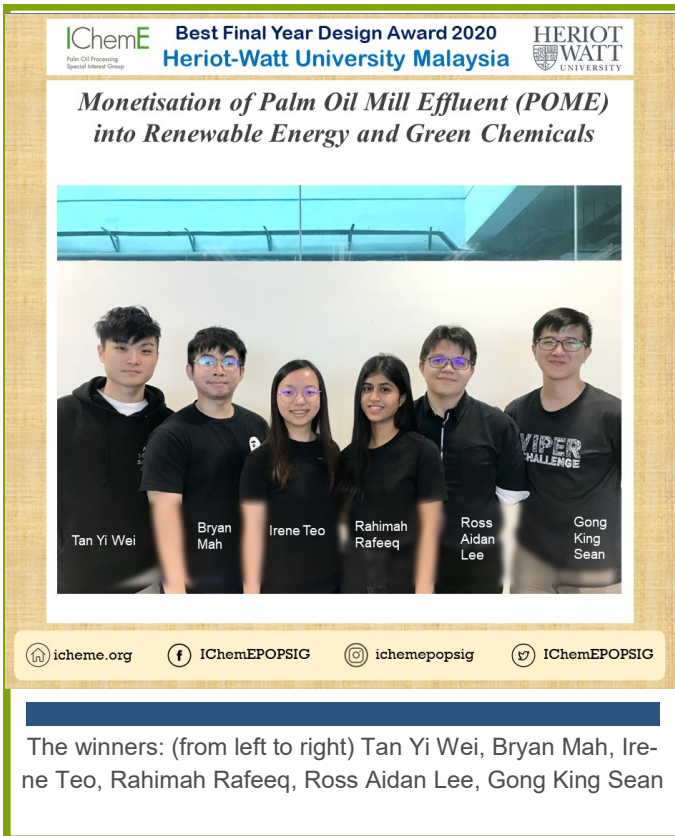
"I am very pleased to be part of this amazing team that had put tremendous effort to present our design idea in monetising POME to green chemicals and renewable energy. I want to use this opportunity to express my deepest gratitude to my supervisors and teammates to make this achievement possible. I wish this proposal by us provide innovative and design idea in promoting sustainable and green technology to the palm oil industry." - Tan Yi Wei, team member.

"I'm grateful for this experience to participate and provide feasible solution on palm oil industry. My key takeaway as an engineer is to provide a sustainable and environmentally friendly solution. I would like to thank my highly motivated teammates and supervisors that have guided us throughout the project." - Rahimah Rafeeq, team member.

"Congratulations to the team for this great achievement. This competition provided a platform for students to solve challenging design topic relevant to the current industry. The students were able to hone their skills in preparing the design and presenting it at a high level to academic and industrial panels. We are very proud of their achievements." - Assistant Professor Ng Lik Yin, co-supervisor of the team.

"A great achievement for the team. Kudos to them for their effort and dedication. Their project was assessed by experienced professionals from the industry and academia. In that sense, this award reflects their high competency and offers a testimony of the heights that our students reach at HWUM. We are proud of them." - Assistant Professor Viknesh An-diappan Murugappan, co-supervisor of the team.

"Congratulation to the team for their continuous efforts in designing a chemical plant that convert palm oil mill effluent into value-added products. This project allows the students to apply their chemical engineering knowledge into an actual industry case study. With such experience, I am sure the students are well prepared and ready to contribute to the industry." - Professor Ir. Denny Ng, main supervisor of the team.



The winners: (from left to right) Tan Yi Wei, Bryan Mah, Irene Teo, Rahimah Rafeeq, Ross Aidan Lee, Gong King Sean

Team Member Quotes

"Thanks for the given platform for us to apply our domain knowledge in designing a feasible solution for the downstream palm oil processing. With the concept of glocalization, we hope to contribute towards the sustainability of our nation's palm oil industry. Also, thumbs up to all of us and together, we make everything appears manageable!" - Irene Teo Lui Ruen, team leader.

"I was very grateful for the opportunity to explore this subject matter together with my dedicated teammates and supervisors. It was a valuable learning process searching for solutions to the Monetisation of Palm Oil Mill Effluent (POME) into Renewable Energy and Green Chemicals and we as a team are delighted to be chosen as the winners." - Ross Aidan Lee, team member.

IChemE **Best Final Year Design Award 2020** Heriot-Watt University Malaysia

Monetisation of Palm Oil Mill Effluent (POME) into Renewable Energy and Green Chemicals

Main Supervisor
Prof Ir
Denny K.S. Ng
PhD, FIChemE, FHEA, PEng, CEng, MIEM

Co-supervisor
Dr
Ng Lik Yin
PhD, MChemE, CEng

Co-supervisor
Dr
Viknesh Andiappan
PhD, MChemE, CEng

icheme.org | IChemEPOPSIG | ichemepopsig | IChemEPOPSIG

Supervisors of the winning team.

IChemE **Best Final Year Design Award 2020** Heriot-Watt University Malaysia

Monetisation of Palm Oil Mill Effluent (POME) into Renewable Energy and Green Chemicals

PROBLEM STATEMENT
5 tonnes Water → 1 tonne of CPO → 3 tonnes POME
GHGs emission: 5.5 kg CH₄ / tonne POME, 350 kg CO₂ / tonne POME
Water pollution: pH 4 – 5, BOD 18,000 – 48,000 mg/L, COD 45,000 – 65,000 mg/L

PROJECT SCOPING
Feedstock Analysis & Selection → Plant Location Selection → Market Analysis → Products Selection

PROCESS DESIGN
Technology Evaluation & Selection → Process Flowsheets Development → Key Safety Issue Mitigation → Environmental Issue Mitigation → Equipment Technical Design

PROJECT ECONOMIC APPRAISAL
Utility & Waste Considerations → Equipment Costing Estimation (Class 4) → Economic Analysis → Implementation Planning

FINAL DESIGN
Design Approach of POME to Green Project

icheme.org | IChemEPOPSIG | ichemepopsig | IChemEPOPSIG

The design approach of POME to Green Project.

Technical Summary

Our company, POME to Green Consultancy is involved in the business of downstream palm oil processing to treat POME waste and monetise it into valuable products. POME to Green supports environment friendly production by committing to protect habitat and the well-being of communities. Besides, the biogas released from POME is upgraded into more efficient and high-quality clean fuels for transportation and generating electricity for our nation via green, reliable and efficient technologies to reduce greenhouse gases (GHGs) emissions.

IChemE **Best Final Year Design Award 2020** Heriot-Watt University Malaysia

Monetisation of Palm Oil Mill Effluent (POME) into Renewable Energy and Green Chemicals

BIOGAS UPGRADING
Desulphurisation System → Carbon Dioxide Removal System → CO₂, Biomethane
Elemental Sulphur

POME TREATMENT
POME → Pre-treatment → Biological Treatment → Sludge → Sludge Disposal System → Bio-fertiliser
Water → Post-treatment → Treated Water

Simplified process flow diagram of the processing plant

Together we **THINK** globally and **ACT** locally to clean the waste for better tomorrow

Slogan of POME to Green Consultancy

icheme.org | IChemEPOPSIG | ichemepopsig | IChemEPOPSIG

Simplified process flow diagram of the processing plant.

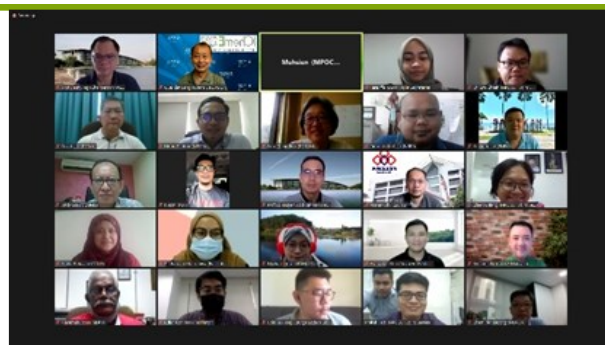
The MSPO Standards Revision Continues

The MSPO Standards, MS2530:2013 series and the Supply Chain Certification Standard used under the MSPO Certification Scheme is a set of national standards that addresses sustainability and traceability requirements of the oil palm industry in Malaysia.

In line with the guiding principles of the Standard Setting and Review Procedure adopted by the Malaysian Palm Oil Certification Council (MPOCC), the MSPO Standards (MS2530:2013 series and Supply Chain Certification Standard) used under the MSPO certification scheme is due for systematic review every 5 years. This is to ensure continued relevance and effectiveness in meeting the stated sustainability objectives of the Standards.

The MPOCC is tasked to undertake the review of the MSPO Standards in close cooperation with the Department of Standards Malaysia (Standards Malaysia). The review — started in September 2019 — is now expected to be completed by the end of 2021: a delay of one year due to the coronavirus pandemic.

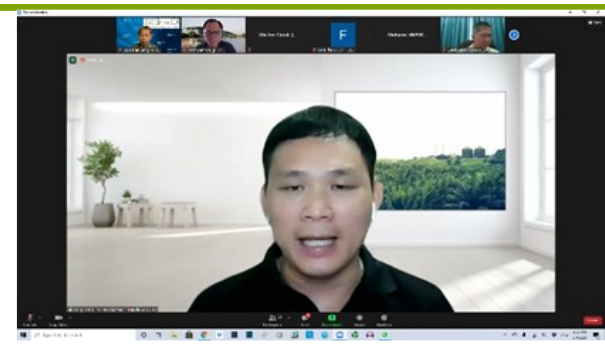
stakeholders, were intense and lengthy. In the absence of the chair, Ir. Hong Wai Onn (Novozymes) chaired 2 of the meetings.



A group picture of the attendees.



Introduction slides of the event.



Ir. Hong Wai Onn during the meetings as the chair.

IChemE is represented by Ir. Qua Kiat Seng with Dr. Chong Mei Fong as his alternative to review of the MSPO Standards.

4a. MS 2530-4-1: 202X; Malaysian Sustainable Palm Oil (MSPO) Part 4-1: General Principles for Palm Oil Mill including Supply Chain Requirements.

4b. MS 2530-4-2: 202X; Malaysian Sustainable Palm Oil (MSPO) Part 4-2: General Principles for Palm Oil Processing Facilities

4c. MS 2530-4-3:202X; Malaysian Sustainable Palm Oil (MSPO) Part 4-3: General Principles for Dealers and Traders.

The first meeting for 2021 was held over 6 days, from 5 – 13 April 2021 on Zoom. The meetings, attended by more than 20

Several important issues — including the environmental, health and safety aspects — were deliberated and defined. Although this working group covers the supply chain, it noted that MSPO Trace on Traceability is still a work in progress by MPOCC. As such, its deliberations are currently only confined to Malaysia.

After correction for errors and consistency by the staff of MPOCC, the draft 1 standards will be available for public comment from 5 May to 4 July 2021. Whilst comments can be made on the Standards Malaysia and MPOCC websites, there will be physical roadshows throughout Peninsular and East Malaysia to gather responses from the stakeholders and the public.

The working group is expected to meet again in September 2021 to review the feedback and prepare draft 2 for the Technical Committee (TC) to finalize for the Minister of Plantation, Industries and Commodities to approve by the end of the year.

Oils & Fats International Congress, OFIC 2021

Oils and Fats International Congress series (OFIC) was launched by MOSTA in 1994 concurrently with an exhibition of the latest available technology for the oils and fats industry. The OFIC 2021 Virtual Conference focused on the significant challenges faced by the oils and fats industry for possible solutions. The virtual conference was held from 15th to 16th June 2021 and was split into three modules: Sustainability and Climate Change, Innovation and Technological Climate Change, and Consumer-Driven Change. The event ultimately closed with an evening forum that focused on the recovery, resilience, and responsibility of the oil palm industry in the post-COVID-19 era.

The range of topics covered by its respective speaker for each module is listed below:

Keynote Address: Development of Green Synthetic Methods by Professor Loh Teck Peng, *Nanyang Technological University, Singapore*.

Plenary Lecture: Managing Change Through Transformation – FGV’s Experience by Tuan Syed Mahdhar Syed Hussain, *FGV Holdings Berhad, Malaysia*.

Module 1: Sustainability and Climate Change

The 18th Tan Sri Dato’ Seri B. Bek-Nielsen Foundation Lecture: How Integrating Resource Management in the Palm Oil Industry Can Shape Global Consensus on the Sustainability of the Humble Oil Palm by Dr Gary W. Theseira, *Forest Research Institute Malaysia (FRIM), Malaysia*.

Climate Change Adaptation Through R&D for Edible Oil Production by Prof Dr Alain Rival, *Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Jakarta, Indonesia*.

The Future of Sourcing Sustainable Commodities – Outlook & Predictions by Mr Mohd Haris Mohd Arshad, *Sime Darby Oils*.

Sustainability and Innovation: Major Techno Social Challenges for the Oil Palm Industry in a Rapidly Changing Global Situation by Prof Dr Denis J Murphy, *University of South Wales, United Kingdom*.

Module 2: Innovation and Technological Climate Change

The 5th Raja Alias Foundation Lecture: CRISPR Gene-Editing as a Modern Breeding Technology: How this is replacing Gene-Modification of Oil Crops? by Prof Dr Kan Wang, *Iowa State University, Ames, Iowa, United States of America*.

Real-Time Forest Sustainability Monitoring of Palm Grow-

ing Regions by Dr Jason Schatz, *Descartes Lab Inc, United States of America*.

The 5th Tun Dr Lim Keng Yaik Foundation Lecture: The Future of Palm/Agriculture 4.0: A Field Deployment Experience by Mr Chia Chai Chua, *Olam International Ltd, Singapore*.

Use of Green Technology for Mitigating 3-MCPD Esters and Enhancing Oil Extraction & Biodiesel Production by Mr Martin Rushworth, *Novozymes Malaysia Sdn Bhd, Malaysia*.

Blockchain-Powered Digital Pipe for Traceability & Digitalization of Sustainable Supply Chains by Mr U. R. Unnithan, *DIBIZ Pte Ltd, Singapore*.

Module 3: Consumer-Driven Change

Specific and Regiospecificity in Fat Nutrition: More Consumer Choices of Natural and Modified Oils by Dr Mahinda Abeywardena, *CSIRO, Adelaide, Australia*

Challenges of the Oleochemical Industry: What to Expect by Dr Marc Kellens & Mr Dario Altera, *Desmet Ballestra Group, Belgium*.

Evening Forum: Recovery, Resilience, and Responsibility of the Oil Palm Industry in the Post COVID-19 Era

Policy directives to Reduce GHG Emissions and Addressing Escalating Trade Tensions by Dr Gary W. Theseira, *Senior Research Officer/Technical Consultant, FRIM Malaysia*.

Palm Oil Quality, Food Safety and Bioenergy by Mr U. R. Unnithan, *Founder & CEO, DIBIZ Pte Ltd, Singapore*.

Consumer Concerns and Perceptions Regarding Health and Environmental Effects by Dr Kalanithi Nesaretnam, *Co-Founder, Climate Governance Malaysia*.

Climate-smart Financing Sustainable Oil Palm by Ms Lu-
anne Sieh, *Senior Managing Director, Head Group Sustainability and Corporate Responsibility, CIMB Group*.

Technological Innovations to Transform the Oil Palm Industry by Dr Harikrishna K, *Chief Research & Development Officer, Sime Darby Plantations Malaysia*.

Genome Editing: Molecular Scissors for Oil Palm Development by Dr Ahmad Parveez, *Director General, Malaysian Palm Oil Board (MPOB)*.

Palm Oil Industry in the New Post-Covid 19 World by Prof Denis Murphy, *University of South Wales, United Kingdom*.

IOI Pan Century Oleochemicals Wins Challenge Trophy at PMHA

IOI Pan-Century Oleochemicals Sdn Bhd (Pasir Gudang, Johor) bagged the “Challenge Trophy” in the 2019/20 Prime Minister’s Hibiscus Awards (PMHA) out of the 72 private sector companies participating. The company also won the “Excellent Achievement Category in Environmental Performance” and “State Award” for showcasing the best environmental performance amongst all Johor participants. The awards were presented by Prime Minister Tan Sri Muhyiddin Yassin in the virtual presentation ceremony (PHMA’s official Facebook page) held on 25 February 2021.

IOI Pan-Century Oleochemicals Sdn Bhd is a wholly-owned subsidiary of IOI Oleochemical Industries Bhd, under IOI Group. The company was awarded in recognition to its great emphasis on environmental initiatives, investment in green technology and sustainability practices. These include cogeneration plant, reverse osmosis plant, rainwater harvesting, solar thermal system and so on.

The Prime Minister’s Hibiscus Award serves to present an opportunity for public recognition of business and industry’s environmental accomplishment, and create environmental awareness amongst enterprises that have yet to demonstrate stewardship and identify areas for improvement in environmental management.

The biennial award is jointly organised by three of Malaysia’s non-profit organisations namely, the Environmental Management and Research Association of Malaysia (Ensearch), Federation of Malaysian Manufacturers (FMM) and Malaysian International Chamber of Commerce and Industry (MICCI), focusing on corporate environmental responsibility. The award is also fully supported by the Environment and Water Ministry as well as the Environment Department, according to the statement.



Screenshot from PHMA Facebook Page: IOI Pan-Century Oleochemicals Sdn. Bhd. accorded the “Excellent Achievement Award”

References

1. <https://www.ioigroup.com/content/MEDIA/PDF/BeritalOI/Issue89.pdf>
2. <https://www.nst.com.my/news/nation/2021/02/669048/ioi-pan-century-oleochemicals-wins-challenge-trophy-pmha>

Call for Article Submission



POPSIG PALM OIL-THEMED ARTICLE 2021

Call for article

Theme: Correcting the misperception on palm oil

<div style="background-color: #ffcc00; padding: 5px; margin-bottom: 10px;"> Introduction </div> <ul style="list-style-type: none"> Palm oil, one of the world's most important crops, touches many important aspects ranging from economy, society, and environment. There has been much debate about the impact of palm oil-related activities for decades. 	<div style="background-color: #ffcc00; padding: 5px; margin-bottom: 10px;"> Scope of article </div> <ul style="list-style-type: none"> Discuss any myths, misinformation, misperception or incorrect information about palm oil. <div style="background-color: #ffcc00; padding: 5px; margin-bottom: 10px;"> Ideas </div> <ul style="list-style-type: none"> Does it kill orangutans? Is the palm oil industry sustainable? Is it safe for frying? <p style="color: white;">We welcome any idea you would like to discuss.</p>	<div style="background-color: #ffcc00; padding: 5px; margin-bottom: 10px;"> Deadline: (Open all year round) </div> <ul style="list-style-type: none"> Selected article will be published in POPSIG Newsletter Submission by: <ol style="list-style-type: none"> 1. 15 May 2021 (June 2021 Issue) 2. 15 Aug 2021 (September 2021 Issue) 3. 15 Nov 2021 (December 2021 Issue)
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RM200

for selected article

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Call for Student Bursary

POPSIG STUDENT BURSARY 2021



Introduction

1. Provides **financial assistance** for students to attend relevant scientific conferences, workshops or forums.
2. To spur the students' motivation and **support their research** in **palm oil processing**
3. Make the palm oil processing conferences or events more **accessible** to the students

Requirement

1. Eligible to all **palm oil processing**-related activities
2. Submit **application form** and **conference report**
3. Deadline: at least **6 months** before the event date



RM1000 max
per event

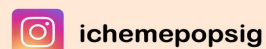
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POPSIG Best Final Year Design Project Award

**RM2000/ STUDENT'S
PROJECT**



Introduction:

1. Encourage the students to involve in palm oil-theme design projects.
2. Project revolves around upstream/downstream processing or novel/improved technologies.

Requirement:

1. Final year undergraduate student
2. Submit application form, design report and supervisor's confirmation report
3. Deadline: 30 September every year



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Improving Sustainability of Palm Oil Production by Increasing Oil Extraction Rate: a Review

Chew, C.L., Ng, C.Y., Hong, W.O. et al. *Improving Sustainability of Palm Oil Production by Increasing Oil Extraction Rate: a Review. Food Bioprocess Technol* 14, 573–586 (2021). <https://doi.org/10.1007/s11947-020-02555-1>

Abstract

Palm oil is the world's most-produced vegetable oil that is serving as an important source of food and energy for many developing and underdeveloped countries. The global demand for palm oil will continue to rise, owing to the growing population and economy. Presently, tremendous efforts have been devoted to improving the sustainability of palm oil production. One strategy is to improve the oil extraction rate (OER) during the milling process. The average OER in Malaysia has remained stagnant between 19 and 21% for the past 40 years. Based on the world production of palm oil in 2018, approximately 3 million tonnes of additional palm oil can be produced globally with a 1% increase in OER. In this paper, the current status of the palm oil milling process and the factors affecting the OER are discussed. Subsequently, the methods to improve the OER are reviewed. Furthermore, the importance of producing good quality oil whilst improving the OER is emphasised. In conclusion, some of the methods reviewed have the potential for industrial application and they warrant further investigation.

Keywords Palm Oil, Oil palm, Palm oil mill, Oil extraction, Oil recovery, Sustainability

The full paper is available at: <https://rdcu.be/cnCNu>



UPCOMING EVENTS

DATES	EVENTS
30th June	Saving Costs and Going Green by Taking Control of Your Emissions
31st July	UCSI IChemE Student Chapter—POPSIG Webinar
3rd August	IChemE Student Summit 2021—Palm Oil, Process Control and Advanced Materials
23rd August	Current Technological Development and Future Prospects
20th September	Webinar 12
28th September	Webinar 13
September	University Roadshow and Virtual Site Tour in East Malaysia
5th October	Webinar 14
26th October	Webinar 15 + Seminar
October	IChemE Malaysia Awards
9th November	Webinar 16
14th December	Webinar 17

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